

S100/S300 Series User Guide



S100/S300 Series
Stationary Wastewater Samplers
for Non-pressurised Sampling Points



Wastewater Samplers for the World



Issue 1.1

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WARRANTY

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AQUACELL S100/S300 SERIES WASTEWATER SAMPLER - NEW PRODUCT WARRANTY

Thank you for choosing an Aquamatic Wastewater Sampler. The Sampler, when properly used and maintained, should give many years of reliable service. To mark our confidence in your new Aquamatic Sampler it comes with the following guarantee:

Electrical and/or mechanical defects occurring during the 12 months from the date of invoice will be rectified free of charge provided the defective item is returned carriage paid to the supplier during this 12 month warranty period.

See MAINTENANCE (page 5.1) for details of Breakdown Service.

Please read this User Guide carefully, as neither Aquamatic Ltd. nor its agents accept responsibility for any damage or defect caused by misuse, abuse, neglect or incorrect operation.

Aquamatic Wastewater Samplers are subject to continuous development and improvement. Components and specifications may change without notice.

One copy of the 'User Guide' is included with each Sampler. This is intended to assist the reader in the effective application of the product and although the information contained is given in good faith, Aquamatic Ltd. accepts no responsibility or liability for any loss or damage arising from the use of information provided or from information being omitted.

In any event Aquamatic Ltd. accepts no liability for any consequential loss or damage arising from the use or failure of the product or any information provided, including, but not limited to, economic or financial loss, damage to peripheral equipment or products, loss of use, productivity or time.

Discrepancies in Content of Consignment/Damage in Transit

On receipt of the consignment it is important to check the following:

- That the consignment matches the supplier's delivery note, and in turn the items specified on your purchase order. See CONTENTS OF PACKAGE page 1.1.
- That no transit damage has occurred.

It is important to report any discrepancies or transit damage within 48 hours, otherwise transit insurance may be invalidated. In any event the cost of rectification would not be covered under the product warranty.

Note: (S300) The packaging material protecting the Sampler can be removed for inspection purposes (temporarily if appropriate) without the need to remove the Sampler from its palette. See page 3.20.

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Storage of the Sampler Prior to Installation (S300)

The Sampler should be kept in a dry indoor storage area until it is ready to be installed.

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CONTENTS OF PACKAGE

The following is an illustrated list of most of the items appearing on the price list.

Some price list items are omitted as they are fully integrated and not able to be depicted visually. Price list items are also omitted when an illustration serves no useful purpose.

1.1

Samplers - S100

Aquacell S100 Wastewater Sampler

110V powered

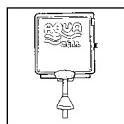
Part Number CL-1501

220V powered

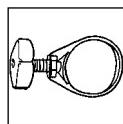
Part Number CL-1513

230V powered

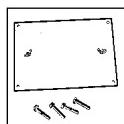
Part Number CL-1502



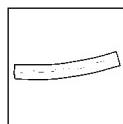
Aquacell S100 Sampler Unit



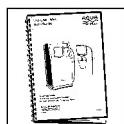
Clip for Intake Hose



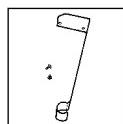
Wall mounting plate with
4 Anchor bolts



Spare Volume Control
Tube



User Guide



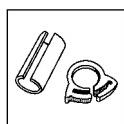
Strain relief bracket with
2 fixing screws



Intake Hose with filter
(10 metres long)



Mains supply cable



Intake Hose Anchor

Samplers - S310

Aquacell S310 Wastewater Sampler

110V powered

Part Number CL-1601

220V powered

Part Number CL-1602

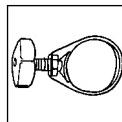
230V powered

Part Number CL-1603

Note: The Sampler's lower compartment is used to transport the Sample Collection Vessel, ancillaries, etc...



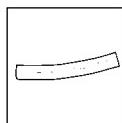
Aquacell S310 Sampler Unit



Clip for Intake Hose



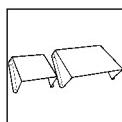
User Guide



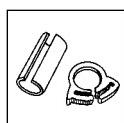
Spare Volume Control Tube



Intake Hose with filter
(10 metres long)



Air Cowls



Intake Hose Anchor

Samplers - S310H

Aquacell S310H Wastewater Sampler

110V powered

Part Number CL-1621

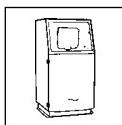
220V powered

Part Number CL-1622

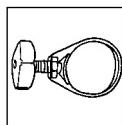
230V powered

Part Number CL-1623

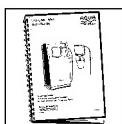
Note: The Sampler's lower compartment is used to transport the Sample Collection Vessel, ancillaries, etc...



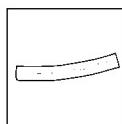
Aquacell S310H Sampler
Unit



Clip for Intake Hose



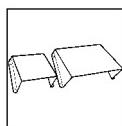
User Guide



Spare Volume Control
Tube



Intake Hose with filter
(10 metres long)



Air Cowls



Intake Hose Anchor

Samplers - S320

Aquacell S320 Wastewater Sampler

110V powered

Part Number CL-1611

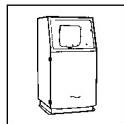
220V powered

Part Number CL-1612

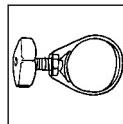
230V powered

Part Number CL-1613

Note: The Sampler's lower compartment is used to transport the Sample Collection Vessel, ancillaries, etc...



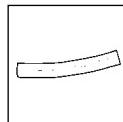
Aquacell S320 Sampler Unit



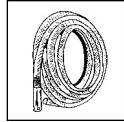
Clip for Intake Hose



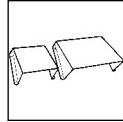
User Guide



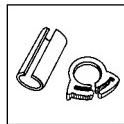
Spare Volume Control Tube



Intake Hose with filter
(10 metres long)



Air Cowls



Intake Hose Anchor

Samplers - S320H

Aquacell S320H Wastewater Sampler

110V powered

Part Number CL-1631

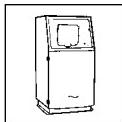
220V powered

Part Number CL-1632

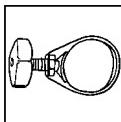
230V powered

Part Number CL-1633

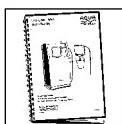
Note: The Sampler's lower compartment is used to transport the Sample Collection Vessel, ancillaries, etc...



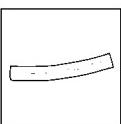
Aquacell S320H Sampler Unit



Clip for Intake Hose



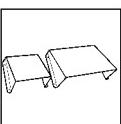
User Guide



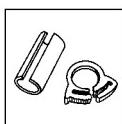
Spare Volume Control Tube



Intake Hose with filter
(10 metres long).



Air Cowls



Intake Hose Anchor

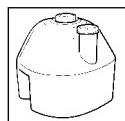
Sample Collection Vessels (SCV's)

Detachable SCV's - Single Containers



10 Litre Polypropylene Container

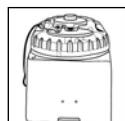
Part Number CL-3005



25 Litre Polyethylene Container

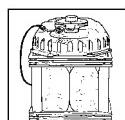
Part Number CL-3001

Detachable SCV's - Bottlers



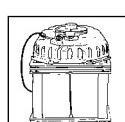
2 x 4.5 Litre Self-Emptying Polypropylene Bottler (S100 only)

Part Number CL-3006



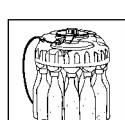
4 x 4.5 Litre Glass Bottler

Part Number CL-3007



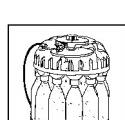
4 x 5 Litre HDPE Bottler

Part Number CL-3008



12 x 0.75 Litre Glass Bottler

Part Number CL-3002



12 x 1 Litre PET Bottler

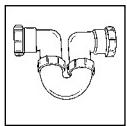
Part Number CL-3003



24 x 1 Litre HDPE Bottler

Part Number CL-3004

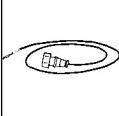
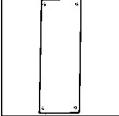
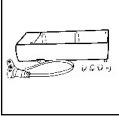
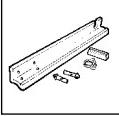
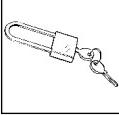
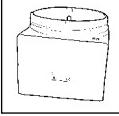
Integral SCV - Bottler



2 x 4.5 Litre Self-Emptying
Polypropylene Integral Bottler (plus
additional integral parts)

Part Number CL-3108

Ancillaries

	Ancillary Signal Connection, Basic (plus additional integral parts) (S100 Sampler only)	Part Number CL-4004
	Auxiliary Equipment Enclosure	Part Number CL-4117
	Auxiliary Equipment Mounting Plate	Part Number CL-4108
	Back-up Battery / Float Charger (plus additional integral parts)	Part Number CL-4024
	Condensate Evaporator Tray (plus additional integral parts)	Part Number CL-4112
	Intake Hose Support Bracket Kit	Part Number CL-4010
	Padlock - S300 Series	Part Number CL-4034
	RS232 Interface (plus additional integral parts)	Part Numbers CL-4047 CL-4097 and CL-4098
	Spare Bottle Carrier*, 2 x 4.5 Litre Self-Emptying Polypropylene Bottler	Part Number CL-4031

* Spare Bottle Carrier, 2x4.5 Litre Self-Emptying Bottler can be used with both Integral and Detachable Bottlers.

1.10



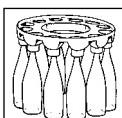
Spare Bottle Carrier,
4 x 4.5 Litre Glass Bottler

Part Number CL-4032



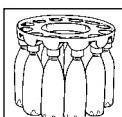
Spare Bottle Carrier,
4 x 5 Litre HDPE Bottler

Part Number CL-4041



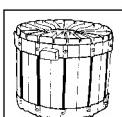
Spare Bottle Carrier,
12 x 0.75 Litre Glass Bottler

Part Number CL-4012



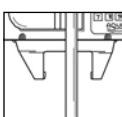
Spare Bottle Carrier,
12 x 1 Litre PET Bottler

Part Number CL-4013



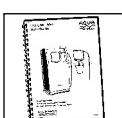
Spare Bottle Carrier,
24 x 1 Litre HDPE Bottler

Part Number CL-4014



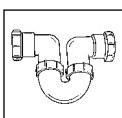
Suspension Bracket

Part Number CL-4034



User Guide

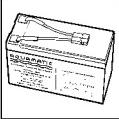
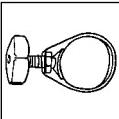
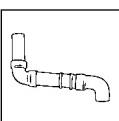
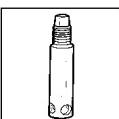
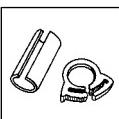
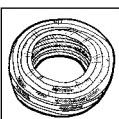
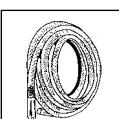
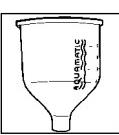
Part Number CL-4113



Wateewater Drain (plus additional
integral parts)

Part Number CL-4102

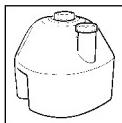
Consumable Spares

	Battery, Sampler	Part Number CL-6026
	Clip for Intake Hose / pinch valve tube	Part Number CL-7001
	Desiccant Bag	Part Number CL-7009
	Distributor pipe, 130 reach 160 reach 160 reach - Extended Spout	Part Number CL-6031 Part Number CL-6030 Part Number CL-6181
	Intake filter	Part Number CL-6059
	Intake Hose Anchor	Part Number CL-4009
	Intake Hose, 30 metre reel	Part Number CL-6089
	Intake Hose with filter (10 metres long)	Part Number CL-6090
	Sample Chamber, Glass Acrylic	Part Number CL-6164 Part Number CL-6028



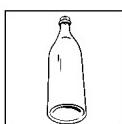
10 Litre Polypropylene Container

Part Number CL-3005



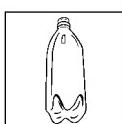
25 Litre Polyethylene Container

Part Number CL-3001



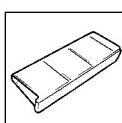
0.75 Litre Glass Bottle

Part Number CL-6034



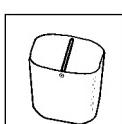
1 Litre PET Bottle

Part Number CL-6035



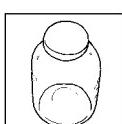
1 Litre HDPE Container

Part Number CL-6036



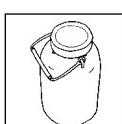
4.5 Litre Polypropylene Container

Part Number CL-6091



4.5 Litre Glass Bottle

Part Number CL-6088



5 Litre HDPE bottle

Part Number CL-6020



12 Litre Polyethylene Bottle

Part Number CL-6173

2

INTRODUCTION

The Sampling Process

The Aquacell S100/S300 Wastewater Sampler extracts individual sample shots from an open (non pressurised) source such as a wastewater channel or vessel, according to a predetermined program and deposits them into one or more Sample Collection Vessels. In this way the user is provided with a representative sample of the wastewater discharge.

Two models in the S300 range incorporate sample temperature control. This is particularly important for biologically active wastewater. The Sample Collection Vessel is contained within the temperature controlled lockable lower compartment of the Sampler. Samples are stored at an average temperature between 0°C and 5°C to minimise degradation during the storage period between sample extraction and analysis.

The refrigerated housing is automatically defrosted.

The way in which samples are used will vary from application to application. For example, samples can be:

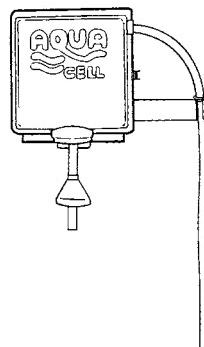
- Analysed using in-house laboratory facilities – when the objective of taking samples is to gain a greater knowledge of the discharge profile with a view to:
 - a) Reducing the pollution load of the discharge (to meet consent conditions – for example).
 - b) Reducing water company effluent charges.
 - c) Reducing product wastage.
- Sent to a specialist analytical laboratory for analysis - when an independent assessment of the discharge is required.
- Made available, to the water company receiving and treating the wastewater, as a source of data on which to base charges. (Self-monitoring is being increasingly encouraged by water companies both in the interests of accurate charging and to encourage dischargers to improve plant efficiency, and so reduce the pollution load of their discharge.)

The Aquacell S100/S300 Samplers

The Aquacell S100 Wastewater Sampler

A wall mounted automatic Sampler featuring the Aquacell Sampler Module*.

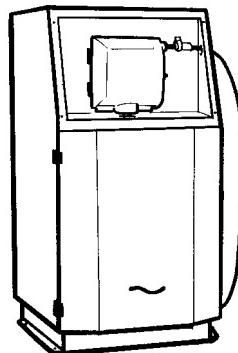
The Sampler Module is supplied with a Wall-Mounting Bracket. An optional Suspension Bracket is available which attaches to the lower edge of the Module and provides a suspension point for the 10 Litre Polyethylene Container. All other Detachable Sample Collection Vessels can be used with the S100 where the installation provides support for the SCV to be suitably located beneath the Sampler Module.



Without, sample temperature control, or sample frost protection, the Sampler is suitable for operation at ambient temperatures between -10°C and +50°C (indoor and outdoor applications).

The Aquacell S300 Wastewater Sampler Series

A range of floor mounted automatic samplers, based on a cabinet constructed from galvanised steel, pre-treated and finished with architectural grade, white polyester powder coating. The range features the Aquacell Sampler Module*. The Sampler Module with lockable front cover is mounted in the upper section of the cabinet and the lockable lower compartment is used to house the Sample Collection Vessel as required. All SCV options in the range are compatible with the S300 range.



The Aquacell S300 Series has four primary variants as follows:

1. Aquacell S310 Wastewater Sampler

Without, Sample Temperature Control. The Sampler is suitable for operation at ambient temperatures between +5°C and +50°C (mainly indoor applications).

* Moulded plastic construction

2. Aquacell S310H Wastewater Sampler

Without, Sample Temperature Control (apart from sample frost protection) The Sampler is suitable for operation in ambient temperatures between -10°C and +50°C (mainly outdoor applications).

3. Aquacell S320 Wastewater Sampler

With, Sample Temperature Control. The Sampler is suitable for operation at ambient temperatures between +10°C and +30°C (mainly indoor applications).

4. Aquacell S320H Wastewater Sampler

With, Sample Temperature Control. The Sampler is suitable for operation at ambient temperatures between -10°C and +50°C (mainly outdoor applications).

Wastewater Drain

All S300 series samplers can be specified with a Wastewater Drain.

When a Sampler is supplied with a Wastewater Drain, the lower compartment of the Sampler provides a useful discharge point for surplus samples, accidental spillage etc.

When a Sampler is specified with a Self-Emptying Bottler, a Wastewater Drain is included.

Samplers incorporating a Wastewater Drain are supplied with a "P" Trap (To accommodate the "P" Trap the Sampler is fitted with a special deep Cabinet Base, which raises the overall height of the Sampler by 140mm). The purpose of the water trap is to prevent cold air leaking from the Sampler's Lower Compartment and adversely effecting temperature control (S320 & S320H only). It also provides a screen against intrusion from insects etc.

Condensate Drain (S320 & S320H only)

A Condensate Drain is incorporated in all samplers with sample temperature control. The Condensate Drain outlet discharges the small volume of condensate water produced by the refrigeration system in the Samplers Lower Compartment. The Condensate Drain incorporates a water trap within the Base of the Sampler Cabinet, to prevent cold air leaking from the Sampler's Lower Compartment and adversely effecting temperature control. It also provides a screen against intrusion from insects, etc. When a Wastewater Drain is specified, it replaces the Condensate Drain.

The User Guide

The User Guide has been written to accommodate the complete Aquacell S100/S300 product range. Much of the information supplied applies equally to all formats, however, where information relates to a specific format, collection vessel or ancillary then it is given under a separate heading so the reader can readily focus on information relating to his particular Sampler.

The Aquacell S100/S300 sampling system is designed for ease of operation and maintenance. If you follow the instructions given in this guide you should quickly be able to benefit from the availability of truly representative wastewater samples.

Safety First

Infection

Aquacell S100/S300 Wastewater Samplers and Sample Collection Vessels have been designed to minimise the risk of operator contact with the potentially hazardous wastewater medium, however great care should always be exercised when working in close proximity to wastewater. Particular attention should be paid to the following points:

1. Wash hands thoroughly after handling contaminated Sampler parts.
2. Do not allow wastewater to come into contact with any open wounds or skin abrasions.
3. If any Glass has become cracked or chipped replace immediately to avoid the risk of cuts.

Electrical

Aquacell S100/S300 Wastewater Samplers are powered by an AC mains supply. As all mains voltage terminals are safely housed behind protective covers then contact with dangerous voltages is avoided.

Mechanical

Care should be taken, whilst the Sampler is in operation, to avoid trapping fingers in the pinch valve assembly.

The Sampler may (if ordered) have a Glass Sample Chamber and/or Glass Sample Collection Vessels, so do take great care when handling as these can be very slippery when wet.

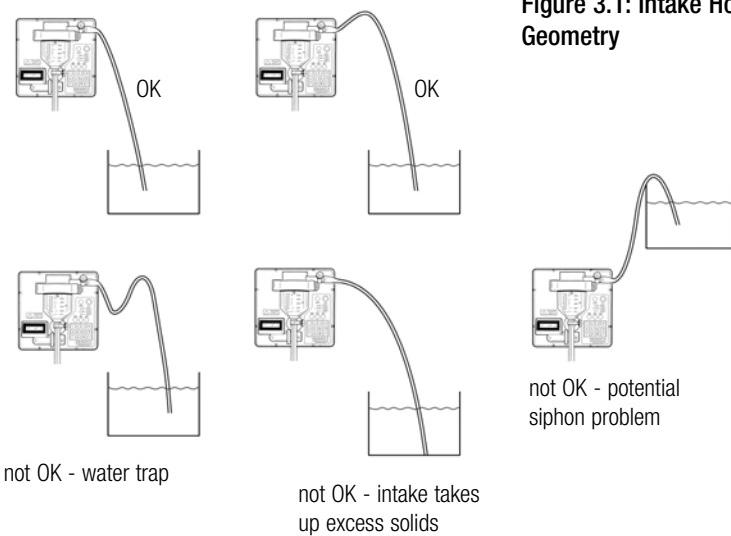
3

INSTALLATION

Choosing a Site

- The Sampler should not be situated in a classified hazardous area.
- The Sampler should be installed as close to the sampling point as possible to minimise cross contamination between successive samples.
- The Sampler is suitable for either indoor or outdoor sites subject to ambient temperature considerations (See page 6.1 Technical Specification for the ambient temperature range of the Sampler being installed). When choosing a site, consideration should be given to the possibility that direct solar radiation could cause the Sampler to rise above its specified maximum temperature. If this possibility exists, then solar screening should be provided.
- The Sampler's Intake Hose should be installed so that it is self-draining. A single high point is permitted (such as a channel wall), as the sample tract is open between samples – see Figure 3.1: Intake Hose Geometry below.
- Choose a sampling point where you can be sure that the wastewater is well mixed – downstream of a measuring flume is ideal.

Figure 3.1: Intake Hose Geometry



- The Intake Level (See Page 3.3 Figure 3.2: Installation Drawing, S100 Sampler or See Page 3.7 Figure 3.4: Installation Drawing, S300 Sampler as appropriate) should be above top water level of the stream from which the samples are to be taken. This avoids the possibility of siphoning.

- **Gravity Drain**

When choosing a site it may be necessary to consider the installation of a gravity drain, to take away unwanted wastewater / condensate water to a suitable disposal point (Often back to the vicinity of the Sampling Point). Please note the following cases where a gravity drain may be required:

S100 Sampler

If the Sampler is to be operated with a 2 x 4.5 Litre Self-Emptying Bottler a gravity drain will need to be constructed to dispose with surplus wastewater.

S300 Series Samplers

If the Sampler is to be operated with a 2 x 4.5 Litre Self-Emptying Bottler, or if the Sampler is specified with a Wastewater Drain, even though it is not intended to be used with a Self-Emptying Bottler, a gravity drain will need to be constructed to dispose with surplus wastewater (and, in the cases of the S320 and S320H the drain will also dispose with the condensate water).

S320 and S320H Samplers

These Samplers are fitted with a condensate water drain unless a Wastewater Drain is fitted. (A Wastewater Drain is fitted if the Sampler is specified with a 2 x 4.5 Litre Self-Emptying Bottler, or if the Sampler is specified with a Wastewater Drain).

If a condensate water drain is fitted to the Sampler there are 3 methods of disposing with the small volume of water, which is discharged as water drips from the fridge evaporator plate. These are as follows:

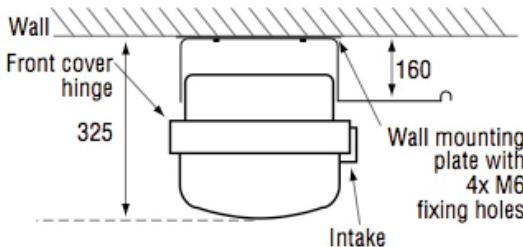
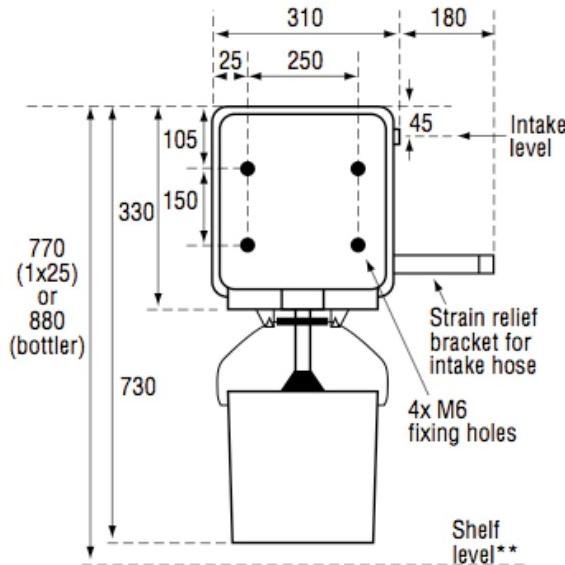
- * Construct a gravity drain from 21.5mm O/D plastic pipe.
- * Deploy a Condensate Evaporator tray (Part Number CL-4112). (Note – This should have been specified with the Sampler order as it cannot be purchased retrospectively).
- * Simply allow the condensate water to soak away into the surrounding earth.

Preparing the Site – Aquacell S100 Sampler

First remove all packing material from the Sampler and its Ancillaries

Figure 3.2: Installation Drawing, S100 Sampler

All dimensions are in mm. Shown with a 10 Litre Container and (optional) Suspension Bracket.



** When installing the Aquacell S100 for use with a 25 Litre Sample Container or with a Bottler, a support shelf will be required (not supplied by Aquamatic).

Sampler / Sample Collection Vessel Location

A wall or similar flat vertical surface is required, on which to mount the Sampler. If the Sampler is to be connected to a Bottler then a shelf should be constructed beneath the Sampler positioned such that the Sampler's Pinch Valve Tube is able to engage in the Sample Collection Vessel to a nominal depth of 60mm.

If the Sampler is to be used with a 2 x 4.5 Litre Self-Emptying Bottler then a pair of Guide Rails for the Bottler should be fitted to the Bottler Support Shelf. This is to ensure that the Bottler Drain Spigot will readily engage with the Expansion Coupling / Gravity Drain when the Bottler is slid into position.

Wastewater Drain Installation (if required)

Construct the drain from 56mm O/D, 50mm I/D plastic pipe.

An expansion coupling is provided with the Bottler, which has a solvent weld joint at one end and a chevron seal at the other.

Terminate the drainpipe by solvent welding the pipe end to the expansion coupling. The expansion coupling should be rigidly supported (possibly by the drainpipe connecting to it) such that the chevron seal aligns with the Drain Spigot at the base of the rear face of the Bottle Carrier, when the Bottler is in position beneath the Sampler. The rubber chevron seal provides a removable coupling for the Bottler

Electrical Power Supply Installation

A suitable electrical supply should be provided for the Sampler - See TECHNICAL SPECIFICATION, (Page 6.1), which is terminated in a switched fused Isolator, mounted adjacent to the Sampler.

A 1.8 metre Power Cable is provided which connects to the bottom rear of the Sampler Module. This cable should be connected to the isolator.

(Optional) Ancillary Signal Connection

See page 3.6, Figure 3.3: Connecting the Sampler to Typical Auxiliary Equipment, Aquacell S100 Sampler. Auxiliary Equipment should be positioned adjacent to where it is intended to mount the Sampler, within reach of the Samplers Ancillary Signals Cable.

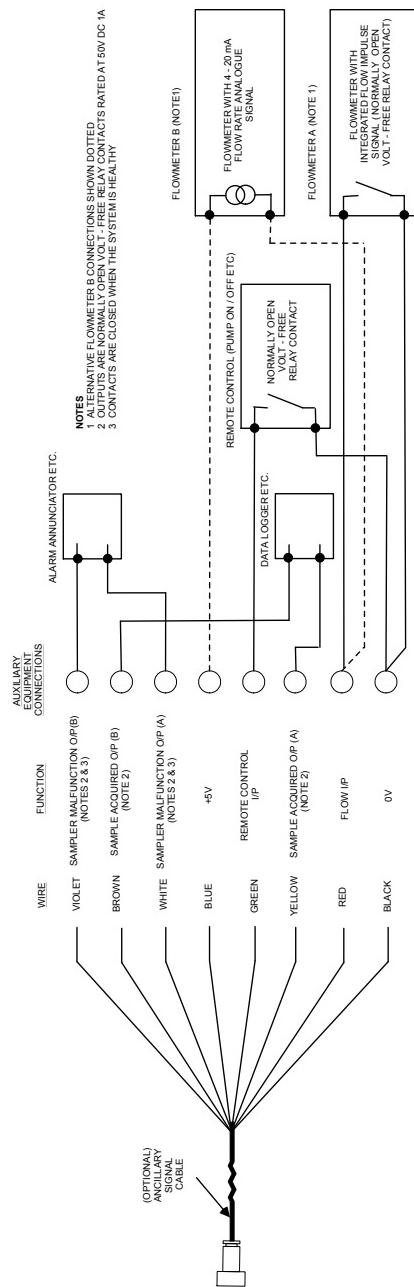
If it isn't possible to mount the Auxiliary Equipment adjacent to the Sampler, then the cables to / from the Auxiliary Equipment should be terminated in one or more Signal Isolators (Not supplied by Aquamatic) mounted adjacent to the Sampler. The isolators should be connected to the Sampler via the Samplers Ancillary Signals Cable.

Isolators are necessary to protect the Samplers inputs / outputs from damaging electrical transients, which are sometimes induced in long cables.

(Optional) RS232 Interface

Where an RS232 Interface is specified, a splitter box is supplied. This box should be mounted close to the Sampler, such that its connectors are accessible. The flying lead from the splitter box connects to the Sampler's ancillary signal connector. The splitter box has 2 labelled connectors mounted on its front face; one for the computer to connect to, via the RS232 interface cable supplied and the other for the ancillary cable connection. If it is not intended to use the ancillary cable, it can be retained for possible future use.

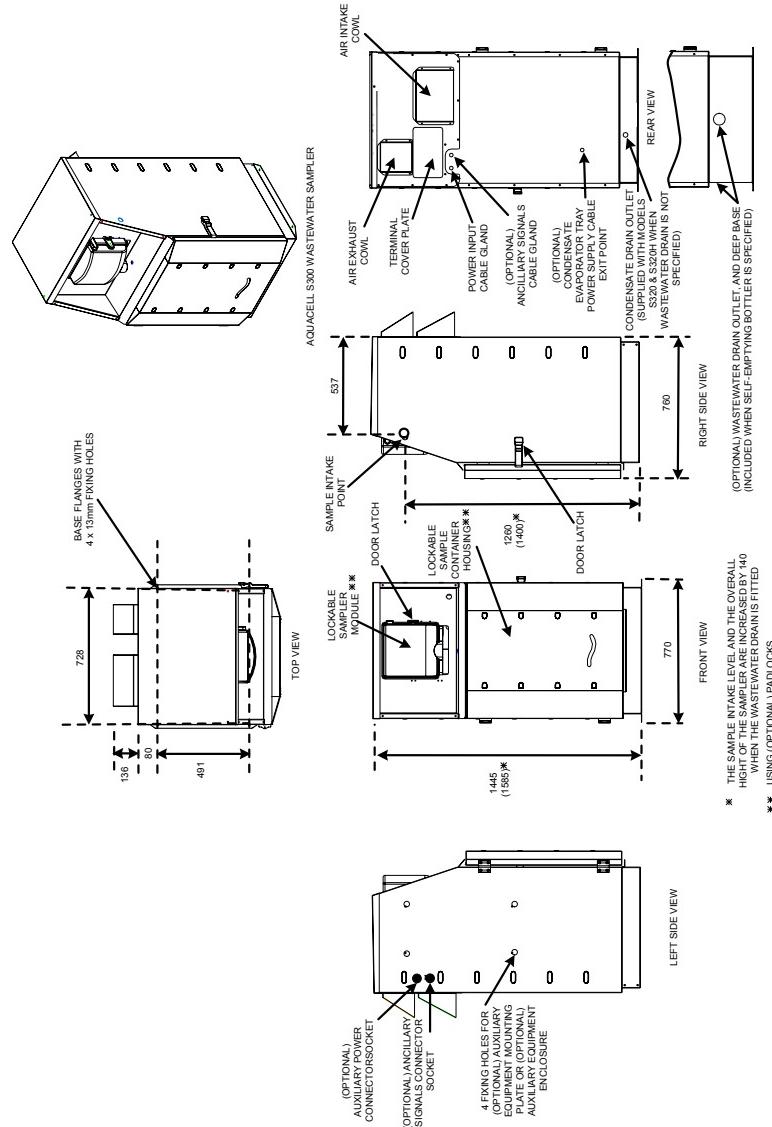
Figure 3.3: Connecting the Sampler to Typical Auxiliary Equipment, Aquacell S100 Sampler



Preparing the Site – Aquacell S300 Series Samplers

First remove all packing material from the Sampler and its ancillaries except for the wooden palette on which the Sampler stands. Note: The Sampler's Lower Compartment is used to transport the Sample Collection Vessel, ancillaries etc.

Figure 3.4: Installation Drawing, S300 Sampler



Sampler Location

See Page 3.7 Figure 3.4: Installation Drawing, Aquacell S300 Sampler.

A flat, horizontal mounting base (typically a 100mm thick concrete pad) should be provided for the Sampler, preferably with a standing area in front and service access to the rear.

Condensate Drain Installation (if required)

Construct the drain from 21.5mm O/D plastic pipe.

It is important when configuring the drain to avoid the possibility of water being removed from the trap by siphon action.

The Sampler is provided with a 21.5mm O/D stub pipe at the bottom rear of the Sampler Cabinet. The drain-pipe is joined to the stub pipe using a suitable fitting.

(Optional) Condensate Evaporator Tray Installation

Attach the 4 Thermal Isolation Springs to the feet of the tray. The springs are quite a tight force fit. The tray gets too hot to touch and the Thermal Isolation Springs serve to isolate the hot under-surface of the tray from the floor that it stands on.

The tray stands on the Mounting Base at the rear of the Sampler suitably positioned beneath the Condensate Drain Outlet Stub Pipe. In this way condensate is deposited into the tray and evaporated off into the atmosphere. The Condensate Evaporator Tray is only energised when the Sampler's Refrigeration Unit is operating (to minimise electricity consumption).

Wastewater Drain Installation (if required)

Construct the drain from 56mm O/D plastic pipe and terminate it in the P-Trap supplied with the Sampler (attach the drainpipe to the output of the P-Trap i.e. the lower connection point).

It is important when configuring the drain to avoid the possibility of water being removed from the trap by siphon action.

The Sampler is provided with a 56mm stub pipe at the bottom rear of the Sampler Cabinet. The P-Trap is attached to the Sampler at this point.

Electrical Power Supply Installation

A suitable electrical supply should be provided for the Sampler - see TECHNICAL SPECIFICATION Page 6.1, which is terminated in a switched fused isolator, fused as indicated on the Samplers Rating Label (beneath the cable glands on the lower rear panel of the Sampler Cabinet). The isolator should be mounted conveniently close to the Sampler's Power Input Cable Gland positioned at the rear of the Sampler.

Auxiliary Equipment Installation

Equipment can be mounted separately from the Sampler and connected to it via the "Optional Connections" Terminal Block mounted in the terminal enclosure at the rear of the Sampler, by specifying the (Optional) Ancillary Signal Connection.

Alternatively equipment can be mounted integrally to the Sampler by specifying either the (Optional) Auxiliary Equipment Plate, or the (Optional) Auxiliary Equipment Enclosure.

See Page 3.11 Fig 3.5: Connecting the Sampler to Typical Auxiliary Equipment, Aquacell S300 Series Samplers for application information.

(Optional) Ancillary Signal Connection

Auxiliary Equipment should be positioned adjacent to the Sampler, such that the cable connecting between the Samplers Optional Connections Terminal Block, and the Auxiliary Equipment doesn't exceed 1.5 metres.

If it isn't possible to mount the Auxiliary Equipment adjacent to the Sampler, then the cables to / from the Auxiliary Equipment should be terminated in one or more Signal Isolators (Not supplied by Aquamatic) mounted adjacent to the Sampler. The isolators should be connected to the Samplers Optional Connections Terminal Block, by a cable not exceeding 1.5 metres.

Isolators are necessary to protect the Samplers inputs / outputs from damaging electrical transients, which are sometimes induced in long cables.

(Optional) Auxiliary Equipment Mounting Plate

Caution: All equipment attached to the mounting plate (including junction boxes, terminal blocks etc.) must be suitably environmentally protected.

See Fig 3.6: Wiring Details - (Optional) Auxiliary Equipment Mounting Plate / (Optional) Auxiliary Equipment Enclosure

The Auxiliary Equipment Mounting Plate is made from stainless steel so any cutting tools used in the preparation of the plate must take this into account

Drill the mounting plate and attach the Auxiliary equipment as required.

Terminate the Mains Cable from the Auxiliary Equipment in the Auxiliary Power Connector provided

Terminate the Ancillary Signal Cable provided, in the Auxiliary Equipment as appropriate.

The Equipment should have 2 strain relieved flying leads coming from it, cut to a suitable length to connect to the mating connectors on the left hand side of the Sampler

(Optional) Auxiliary Equipment Enclosure

See Page 3.12 Fig 3.6: Wiring Details - (Optional) Auxiliary Equipment Mounting Plate / (Optional) Auxiliary Equipment Enclosure

Open the enclosure using the key provided and remove the mounting plate

Drill the mounting plate and attach the Auxiliary equipment as required.

Replace the Mounting Plate in the enclosure

Thread the mains cable out through the top cable gland on the left-hand side of the enclosure and terminate it in the Auxiliary Power Connector provided.

Thread the Auxiliary Signals Cable in through the bottom cable gland on the left-hand side of the enclosure and couple it to the auxiliary equipment as required.

The Auxiliary Equipment Enclosure should have 2 strain relieved flying leads coming from it, cut to a suitable length to connect to the mating connectors on the left-hand side of the Sampler.

Figure 3.5: Connecting the Sampler to Typical Auxiliary Equipment, Aquacell S300 Series Samplers

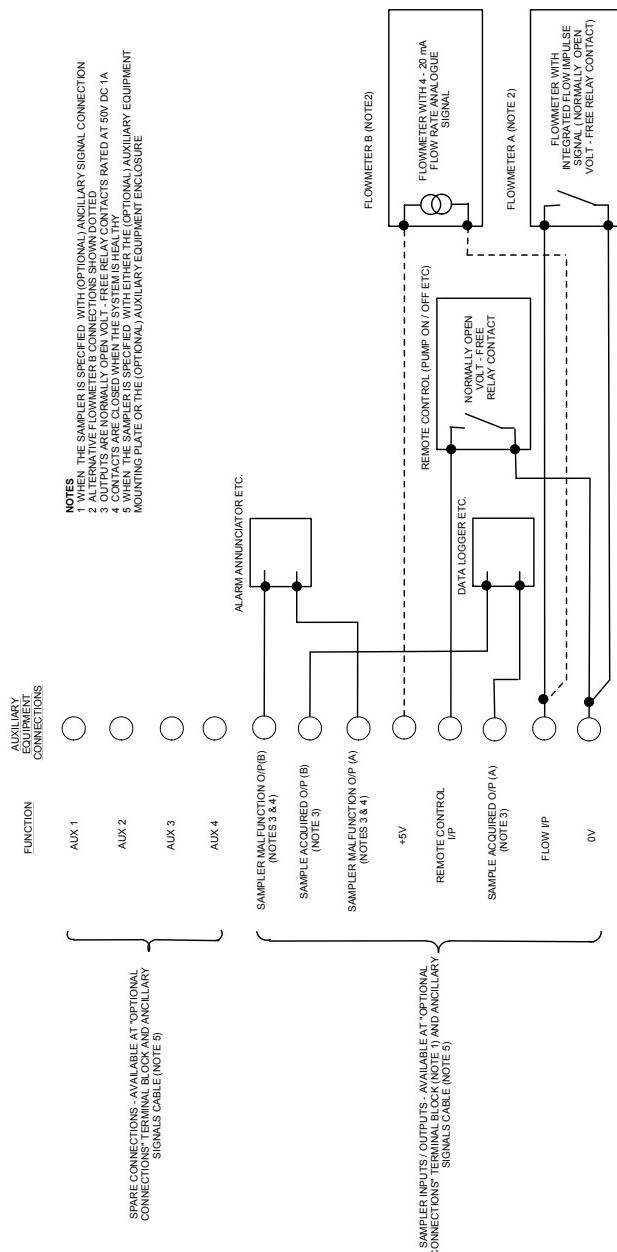
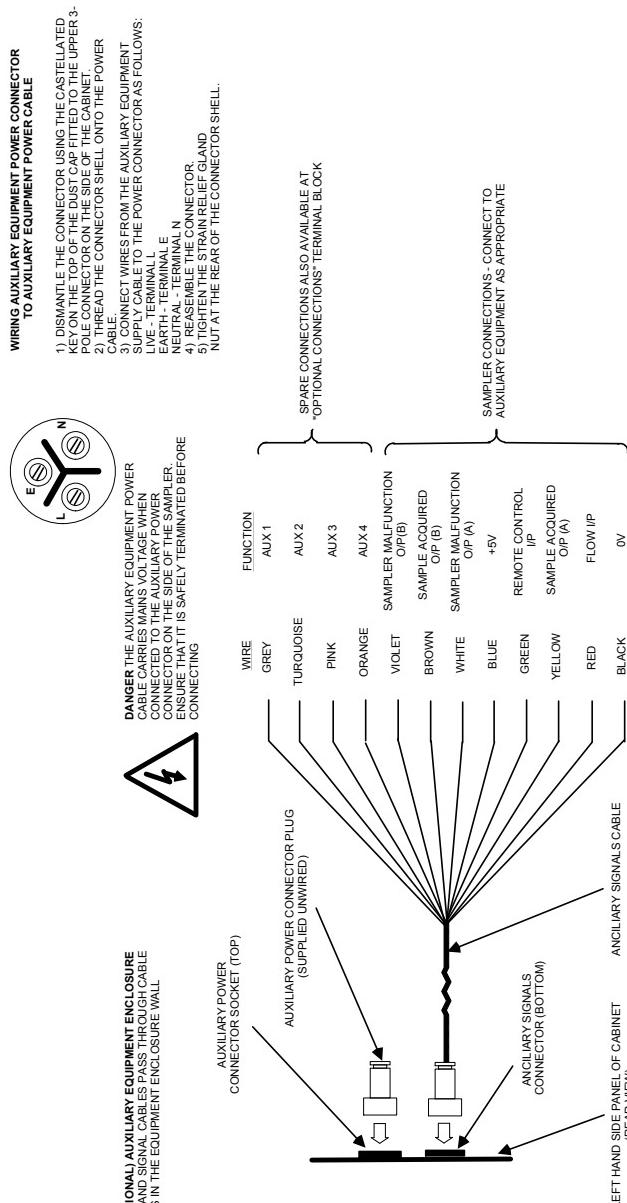


Figure 3.6: Wiring Details - (Optional) Auxiliary Equipment Mounting Plate/ (Optional) Auxiliary Equipment Enclosure



Installation - Aquacell S100 Sampler

Sampler

1. Attach the Wall Mounting Plate to the vertical mounting surface, using the masonry bolts provided (Drill 8mm holes in masonry) or other fasteners appropriate to the mounting surface.
2. Install Back-up Battery (if applicable) – See (Optional) Back-up Battery Installation (Page 3.14)
3. Connect electrical cables to the Sampler Module – See Electrical Connections to the Sampler Module (Page 3.15).
4. Loosen the 2 wing nuts on the Wall Mounting Plate and hang the Sampler on the Mounting Studs.
5. Hand-tighten the 2 wing nuts to firmly secure the Sampler in place.
6. Attach the Strain Relief Bracket to the right hand side of the Sampler Module using the 2 screws provided.
7. Install the Intake Hose – See Intake Hose Installation (Page 3.18)

Sample Collection Vessel (SCV)

1x10 Litre format with (optional) Suspension Bracket

1. Remove the screw top from the pourer in the 10 Litre Container lid.
2. Hang the Container by its wire handle, on the suspension bracket.
3. Place the pinch valve tube in the opening of the Container lid.
4. Slide the black plastic weather shield along the pinch valve tube so that it covers the top opening.

All SCV formats when (optional) Suspension Bracket is not used

1. Position the Sample Collection Vessel beneath the Sampler outlet (single containers - remove the screw cap first).
2. Place the pinch valve tube in the top opening of the Container / Bottler. The tube should engage the Sample Collection Vessel inlet to a depth not exceeding 70mm.
3. Slide the black plastic weather shield along the pinch valve tube so that it covers the top opening.

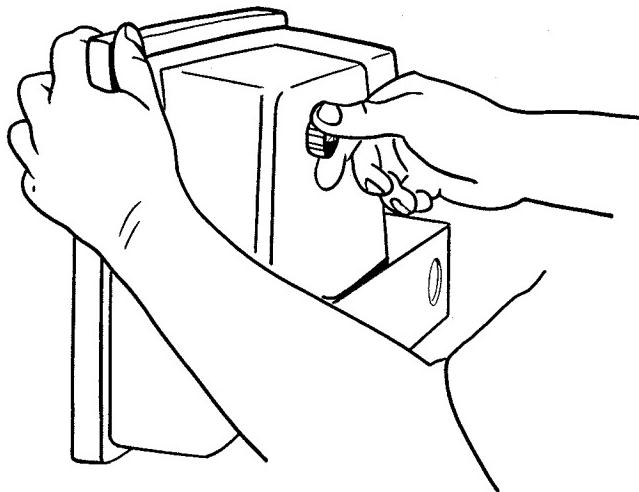
3.14

(Optional) Back-Up Battery Installation

IMPORTANT: The Back-Up Battery should not be connected to the Sampler and left for an extended period before the system is commissioned, as it may become fully discharged. If this happens battery damage could result.

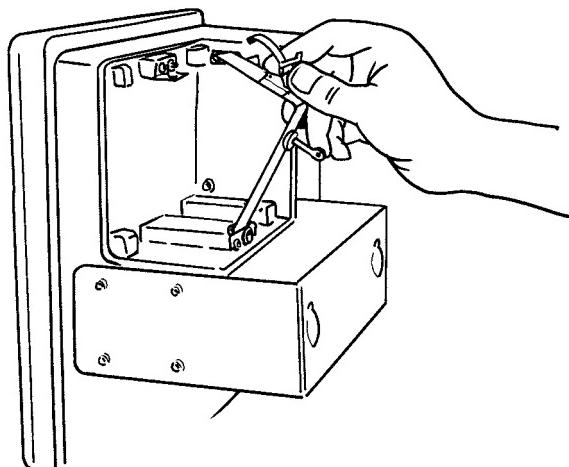
1. Remove the battery cover at the rear of the Sampler Module by unscrewing the black thumb screw.

Figure 3.7



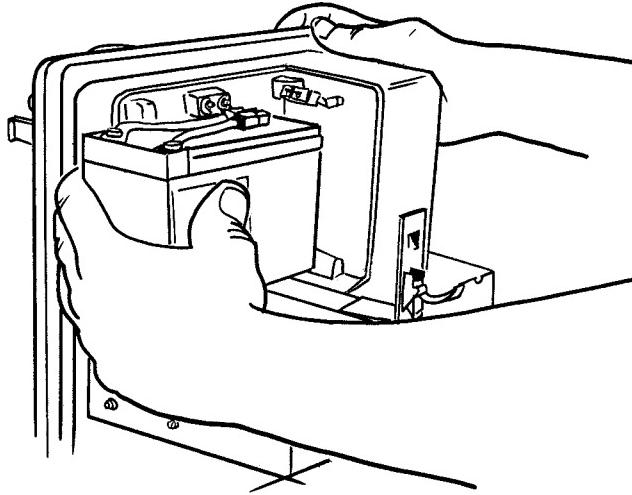
2. Unclip and hinge open the battery retaining strap.

Figure 3.8



3. Place the battery in position by introducing it into the right hand side of the Sampler Module and position it against the front and side bulkheads of the battery compartment, with the terminals adjacent to the battery lead. Make sure that the battery is pushed firmly against the side bulkhead.
4. Secure the battery with the battery retaining strap.

Figure 3.9



5. To connect battery power to the Sampler, connect the battery connector to the Sampler's battery connector.
6. Replace the battery cover and secure by screwing up the black thumb screw.

Electrical Connections to the Sampler Module

See Page 3.17, Figure 3.11: Wiring Details, Aquacell S100 Sampler. Electrical connections to the Sampler Module are made via the connection panel at the bottom rear of the Module. Cable connections to the Sampler Module should be made with the Module laid on its front face so that the labelled connectors are clearly visible - See Page 3.16, Figure 3.10.

When connecting cables to the Sampler Module, care should be exercised to correctly orientate the connectors before applying any force to mate one with the other.

Having mated the connectors correctly the retaining cover should be screwed in place taking care to avoid cross-threading. If difficulty is experienced in engaging the threads, rotate the retaining cover in reverse until a click is observed. Then proceed to rotate the cover in a clockwise direction to secure the connector.

Figure 3.10

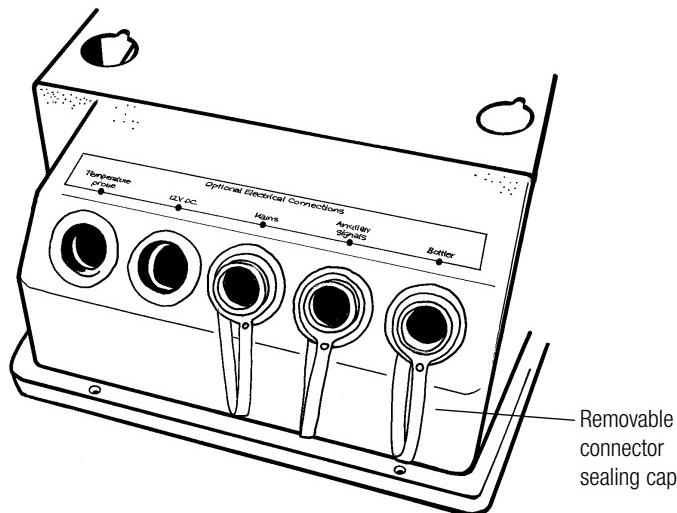
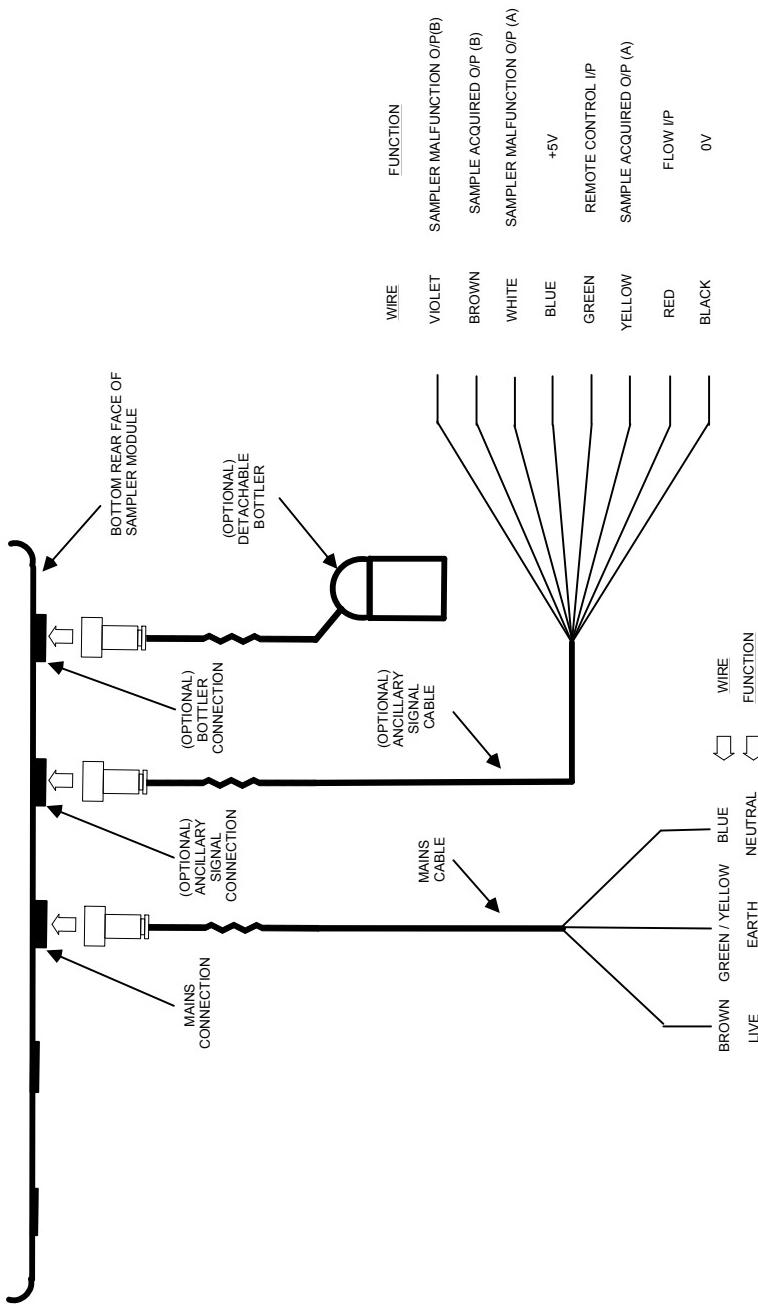


Figure 3.11: Wiring Details, Aquacell S100 Sampler

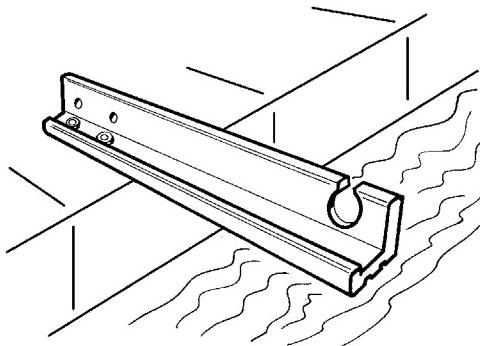


Intake Hose Installation

To ensure that the Sampler is able to extract representative samples, it is essential to take care, over the selection of the Sampling Point and the installation of the Intake Hose. Refer to Choosing a Site (Page 3.1) before proceeding.

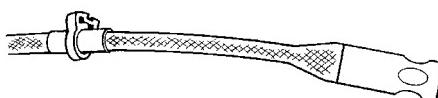
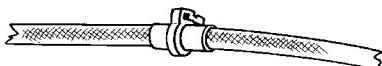
1. Install the (optional) Intake Hose Support Bracket or equivalent means of support for the lower end of the Intake Hose. Note - The Intake Hose Support Bracket Kit includes 2 masonry bolts which require 8mm fixing holes.

Figure 3.12



2. Attach the Intake Hose Anchors to the upper and lower ends of the Intake Hose as shown. Do not tighten the hose clips at this stage.

Figure 3.13



3. Attach the Intake Hose to the Intake Hose Support Bracket and adjust the Intake Hose Anchor so that the Intake Fitter is positioned optimally in the flow. Tighten the hose clip.

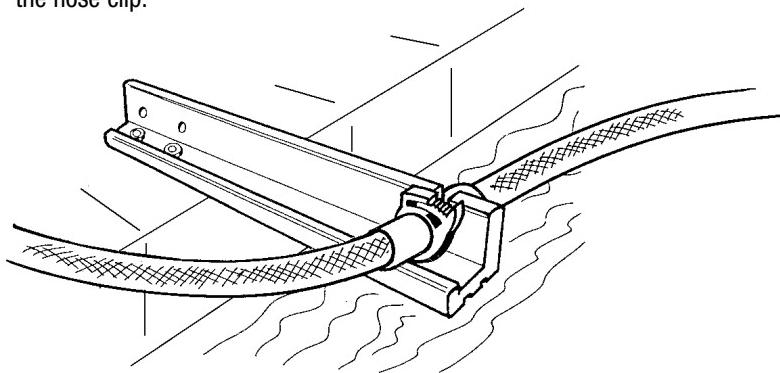
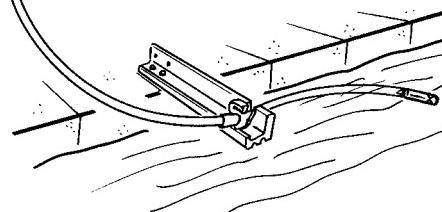
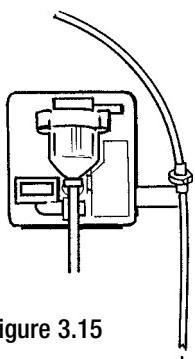


Figure 3.14

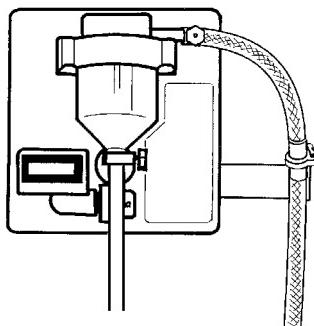
4. Run the Intake Hose along its designated path up to the Strain Relief Bracket on the right hand side of the Sampler Module.
5. Remove any slack from the Intake Hose and adjust the position of the upper Intake Hose Anchor so that the hose suspends in its final intended position.
6. Cut off surplus hose.

Figure 3.15



7. Place the hose clip over the Intake Hose and soften the end of the hose by applying heat using a hot air gun.
8. Push the hose onto the top pipe so that approximately 20mm is engaged and secure in place by tightening the hose clip.

Figure 3.16

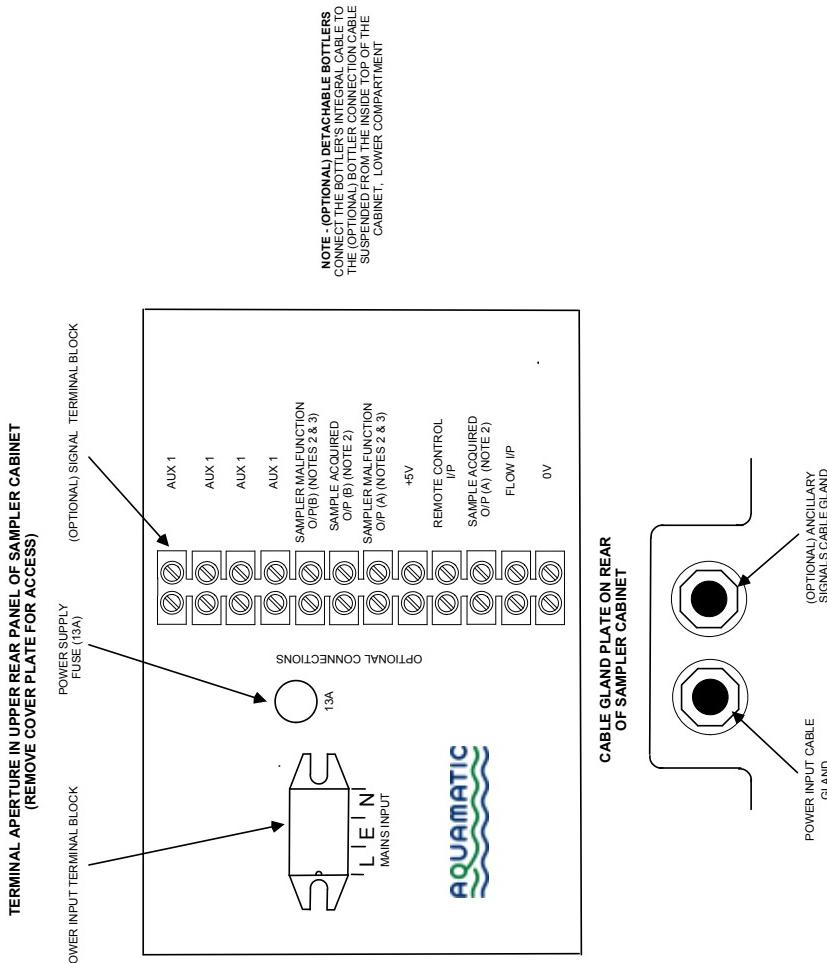


Installation - Aquacell S300 Series Samplers

Sampler

1. Move the Sampler on its wooden pallet to a position close to the prepared base
2. Remove the transit bolts attaching the Sampler to the pallet.
3. Carefully remove the Sampler from its pallet and position it on the prepared base.
4. Fasten the Sampler down on the base using suitable fixing screws in the four 13mm fixing holes in the cabinet base flanges.
5. Attach the 2 Air Cowls using the fixing screws provided.
6. Connect up the gravity drain to the Condensate Drain outlet / Wastewater Drain outlet (if applicable).
7. Install the Back-up Battery (if applicable) – See (Optional) Back-up Battery Installation (page 3.23).
8. Install the Intake Hose – See Intake Hose Installation (page 3.25).
9. Remove the Cover Plate on the Samplers Upper Rear Panel by removing the 4 fixing screws. This exposes the Samplers electrical terminals.
10. Install electrical connections - See Page 3.22 Figure 3.18: Wiring Details, Aquacell S300 Series Samplers.
11. Replace the cover plate.

Figure 3.17: Wiring Details, Aquacell S300 Series Samplers



Sample Collection Vessel (SCV)

Single Containers / Detachable Bottlers

Place the SCV on the Tray in the Lower Compartment beneath the sample outlet (Single containers - remove the screw cap first).

Place the Pinch Valve Tube in the top opening of the Container / Bottler. The tube should engage the SCV to a depth not exceeding 70mm

Integral Bottlers

Position Bottles/Bottle Carrier on the SCV tray as determined by the plastic location pegs.

(Optional) Auxiliary Equipment Mounting Plate

Attach the fully assembled / wired Equipment Mounting Plate to the 4 fixing points on the left-hand side of the Sampler using the fixing screws provided.

Connect the Ancillary Signal Cable to the 12-pole connector on the side of the Sampler.

Connect the Mains Supply Cable to the 3-pole connector on the side of the Sampler.

(Optional) Auxiliary Equipment Enclosure

Use the key provided to open the Enclosure door and gain access to the 4 fixing holes. Attach the fully assembled / wired Equipment Enclosure to the 4 fixing points on the left-hand side of the Sampler using the fixing screws provided.

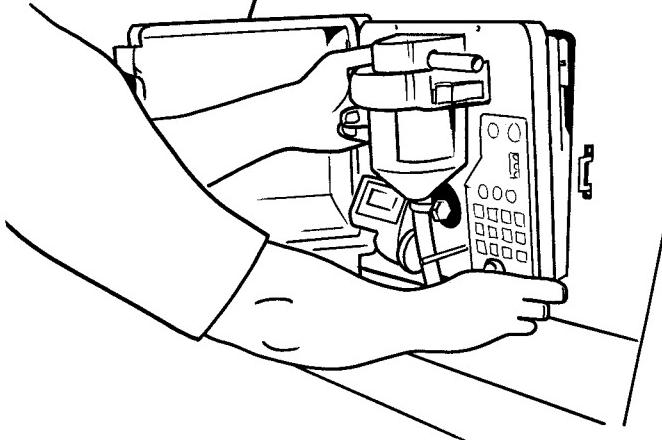
Connect the Ancillary Signal Cable to the 12-pole connector on the side of the Sampler.

Connect the Mains Supply Cable to the 3-pole connector on the side of the Sampler.

(Optional) Back-Up Battery Installation

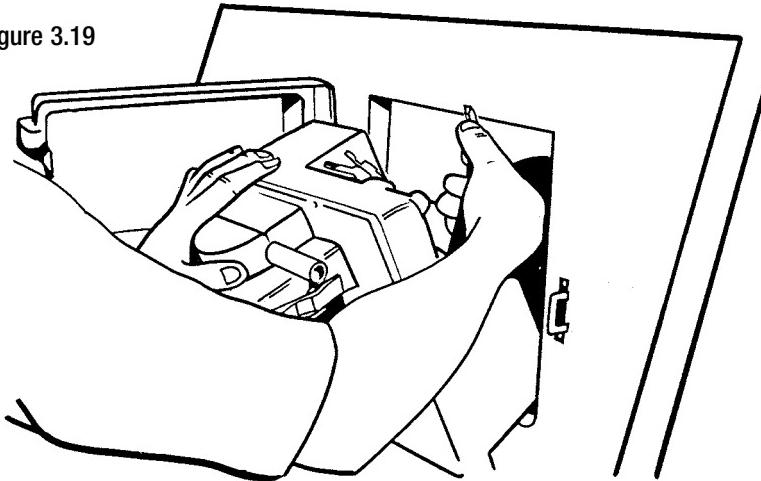
IMPORTANT: The Back-Up Battery should not be connected to the Sampler and left for an extended period before the system is commissioned, as it may become fully discharged. If this happens battery damage could result.

Figure 3.18



1. Remove the four fixing screws from the side flanges of the Sampler Module.
2. Withdraw the Sampler Module from the Sampler Panel.
3. Unclip and hinge open the battery retaining strap.

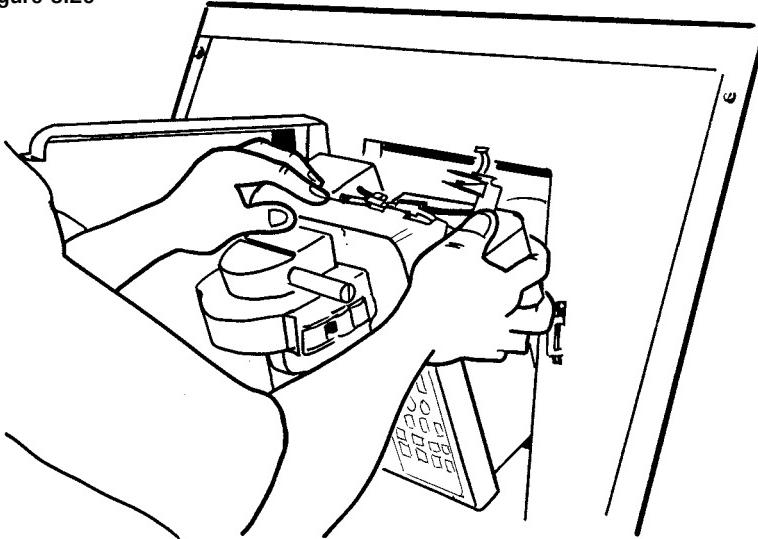
Figure 3.19



4. Lay the Sampler Module face-down on the Sampler Panel Ledge (use a rubber mat or similar to protect the paint surface).

5. Place the Battery in position by introducing it into the right hand side of the Sampler Module and position it against the front and side bulkheads of the battery compartment, with terminals adjacent to the battery leads. Make sure that the Battery is pushed firmly against the side bulkhead.
6. Secure the Battery with the battery retaining strap.

Figure 3.20



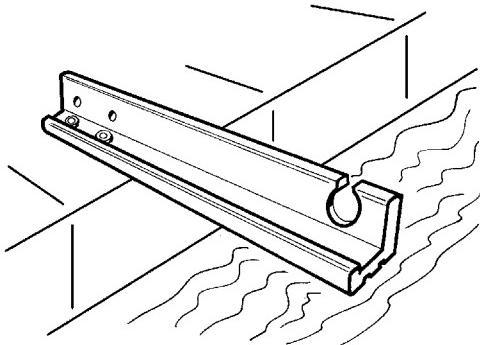
7. To connect battery power to the Sampler, connect the battery connector to the Sampler's battery connector.
8. Replace the Sampler Module in the Sampler Panel.

Intake Hose Installation

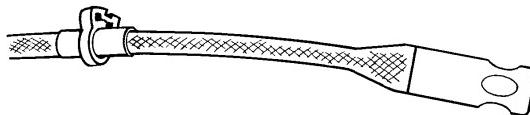
To ensure that the Sampler is able to extract representative samples, it is essential to take care over, the selection of the Sampling Point and the installation of the Intake Hose. Refer to Choosing a Site (Page 3.1) before proceeding.

1. Install the (optional) Intake Hose support bracket or equivalent means of support for the lower end of the Intake Hose. Note - The Intake Hose Support Bracket Kit includes 2 masonry bolts which require 8mm fixing holes.

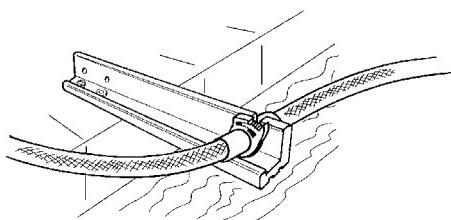
3.26

Figure 3.21

2. Attach an Intake Hose Anchor to the lower end of the Intake Hose as shown. Do not tighten the hose clip at this stage.

Figure 3.22

3. Attach the Intake Hose to the Intake Hose Support Bracket and adjust the Intake Hose Anchor so that the Intake Filter is positioned optimally in the flow. Tighten hose clip.

Figure 3.23

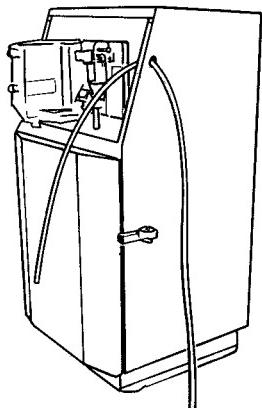
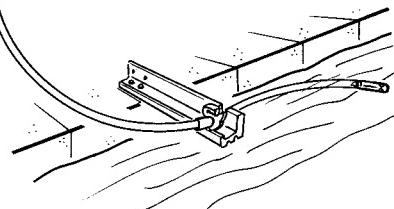


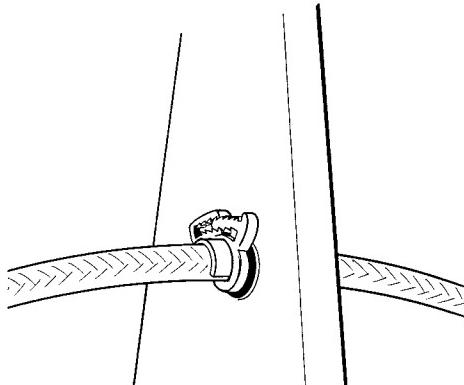
Figure 3.24

4. Run the Intake Hose along its designated path up to the Intake Hose Entry Point on the right hand side of the Sampler Cabinet.
5. Thread the hose through the Intake Hose Entry Point and attach the Intake Hose Anchor to the upper end of the Intake Hose. Only tighten the hose clip sufficiently to support the weight of the Intake Hose at this stage.



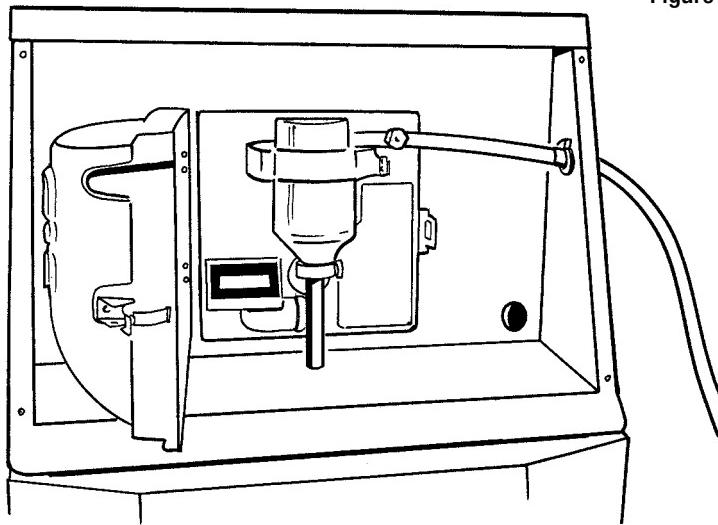
6. Remove any slack from the Intake Hose, adjust the position of the upper Intake Hose anchor so that the hose suspends in its final intended position and tighten the Hose Clip.

Figure 3.25



7. Cut off surplus hose,
8. Place the Intake Hose Clip over the Intake Hose and soften the end of the hose by applying heat using a hot air gun.
9. Push the Intake Hose onto the top pipe so that approximately 20mm is engaged and secure in place by tightening the Intake Hose Clip.

Figure 3.26



4 OPERATION

Definitions

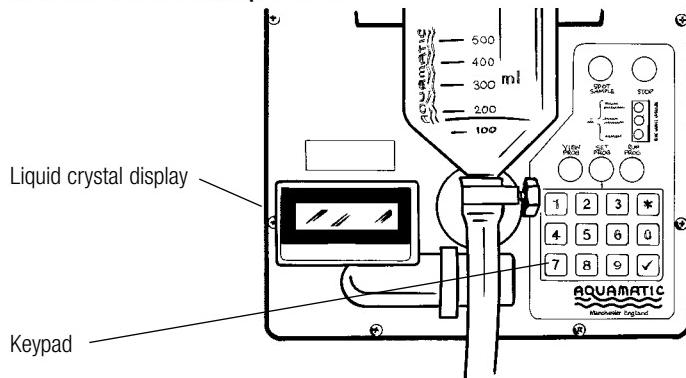
SAMPLING CYCLE	The sequence of operations the Sampler carries out in order to extract a sample shot.
SHOT	An aliquot of liquid extracted from the sampling point by a single operation of the sampling cycle.
SAMPLE	A shot or number of shots extracted in immediate succession and deposited into a single collection vessel.
SAMPLE EVENT	A series of samples extracted in immediate succession and deposited into separate collection vessels.
SPOT SAMPLE	A sample taken by pressing the “SPOT SAMPLE” button.
SAMPLE PROGRAM	A user programmed sequence of samples / sample events which occur when the “RUN PROGRAM” button is pressed.
SYSTEM SETTINGS	System operating parameters as selected by the user for the application.
PROGRAM SETTINGS	The common variables including Start Time, Stop Time, Sample Frequency and Bottle Increment Frequency, separated off to simplify programming.

Basic Operations

Controlling the Sampler

The Sampler is operated / programmed using the 17 button membrane keypad in conjunction with a 16 x 2 character liquid crystal display. When a button is pushed on the keypad a beep sound will be heard.

Figure 4.1: Front Panel of Sampler Unit



The keypad is divided into circular operating buttons and square programming buttons:

Operating Buttons

- | | |
|-------------|--|
| SPOT SAMPLE | To take single samples. |
| SET PROG | To enter or change a program. |
| VIEW PROG | To assess program entered. |
| RUN PROG | To operate Sampler using set program. |
| STOP | This button causes the Sampler to stop mid program or mid spot sample cycle. |

4.2

Programming Buttons

- | | |
|-------|---|
| * | Step through available menus or return to the start of a date / time entry. |
| 0 - 9 | Numerical selections. |
| ✓ | Enter / move to next selection. |

Switching on the Power

Sampler Module Switch-on Routine

All Sampler models carry out this initial routine:

Sampler without a Bottler (and programmed to operate without a Bottler)

Switch the Samplers separate mains isolator on. A double beep sound should be heard from the Sampler Module and the display should briefly show as follows:

AQUAMATIC
VER 02.06.000
INITIALISING

A further beep sound should be heard and the display should show the Default screen as follows, until operation is commenced:

SAMPLER
READY

Sampler with a Bottler (and programmed to operate with a Bottler)

Switch the Samplers separate mains isolator on. A double beep sound should be heard from the Sampler Module and the display should briefly show as follows:

AQUAMATIC
VER 02.06.000

The Bottler distributor arm should drive to the “Bottle 1 position” with the display showing as follows:

TESTING BOTTLER
PLEASE WAIT

A further beep sound should be heard and the display should show the Default screen as follows until operation is commenced:

SAMPLER + BOTTLER
READY

Note: Normally a Sampler will be supplied ready programmed to take into account whether it is intended to be used with a Bottler or not.

If the Sampler has been programmed to operate with a Bottler and a Bottler is not fitted then the display will show:

FAULT
BOTTLER MISSING

Here you have a choice of:

1. Fit the Bottler, switch off the power for 10 seconds and on again.
2. Press the STOP button to return to the Default display, and reprogram the Sampler to operate without a Bottler.

If the Sampler has been programmed to operate without a Bottler and a Bottler is fitted, then the display will show:

FAULT
BOTTLER FITTED

Here you have a choice of:

1. Remove the Bottler and press the STOP button to return to the Default display
2. Press the STOP button to return to the Default display, and reprogram the Sampler to operate with a Bottler. Then switch off the power for 10 seconds and on again

S100

The Sampler Module carries out the switch-on routine (see above).

S310

The Plant Zone Fan (located in the Plant Zone at the upper rear of the cabinet) will start up and run continuously for as long as the Sampler is powered up.

The Sampler Module will carry out the switch-on routine (see above)

S310H

The Plant Zone Fan (located in the Plant Zone at the upper rear of the cabinet), and the Container Zone Fan (located behind the grill at the top of the Container Zone) will start up and run continuously for as long as the Sampler is powered up.

The Sampler Module will carry out the switch-on routine (see above)

S320

The Plant Zone Fan (located in the Plant Zone at the upper rear of the cabinet), and the Container Zone Fan (located behind the grill at the top of the Container Zone) will start up and run continuously for as long as the Sampler is powered up

4.4

After a 3 minute delay the Refrigeration Unit will start up (provided the ambient temperature is above 1⁰C).

The Sampler Module will carry out the switch-on routine (see above)

S320H

The Plant Zone Fan (located in the Plant Zone at the upper rear of the cabinet), and the Container Zone Fan (located behind the grill at the top of the Container Zone) will start up and run continuously for as long as the Sampler is powered up.

After a 3 minute delay the Refrigeration Unit will start up (provided the ambient temperature is above 1⁰C)

If the ambient temperature is above 32°C the Vent Fan behind the Small Air Cowl will run.

The Sampler Module will carry out the switch-on routine (see above)

Taking a Spot Sample

Press SPOT SAMPLE button on keypad. Sampler should extract a single sample of water from the sampling point and deposit it in the Sample Collection Vessel according to the SAMPLE CYCLE as follows:

1. Valve clicks to vent pinch valve and then pump starts to run and pinch valve closes.

Display shows:

SAMPLING NOW
CLOSE VALVE

2. Air is blown out of Intake Hose for a short period. (**PRE PURGE** time - factory set to 3 seconds.)

Display shows:

SAMPLING NOW
PRE PURGE

3. Sample is drawn up Intake Hose at a nominal 0.5 metres/second and fills Sample Chamber up to the level of the lower tips of the 2 long electrodes.

Display shows:

SAMPLING NOW
INTAKE

4. Water is expelled from Sample Chamber back up the Volume Control Tube and down the Intake Hose until the level reaches the bottom of the Volume Control Tube. (A metered volume is thus trapped in the Sample Chamber.) This second air purge continues until water is completely removed from the sample tract. (Post purge time - factory set to 6 seconds.)

Display shows:

SAMPLING NOW
POST PURGE

5. Pinch valve opens and sample is expelled from Sample Chamber into Sample Collection Vessel.

Display shows:

SAMPLING NOW
SAMPLE RELEASE

Setting the Purge Times

Pre Purge Time

The time required, to expel the column of water from the submerged sample Intake Hose. This time is factory set to 3 seconds.

The **PRE PURGE** time should be long enough to ensure that water is expelled from the Intake Hose followed by bubbles emitted from the end of the Intake Hose for approximately 2 seconds.

Post Purge Time

The time required, to expel the excess water from the Sample Chamber and in turn, the Intake Hose. This time is factory set to 6 seconds.

The **POST PURGE** time should be long enough to ensure that water is expelled from the Sample Chamber / Intake Hose followed by bubbles emitted from the end of the Intake Hose for approximately 2 seconds.

Both times are adjusted (if necessary), by taking repeated spot samples and successively changing the time(s) (see *Programming the Sampler* below) until the above criteria are met.

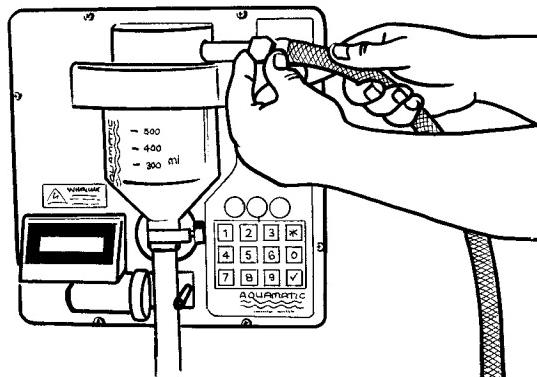
Removing / Refitting the Sample Chamber

Removing and refitting the Sample Chamber is necessary when changing the sample shot volume and when cleaning, it is therefore useful to become familiar with this simple operation.

Proceed as follows:

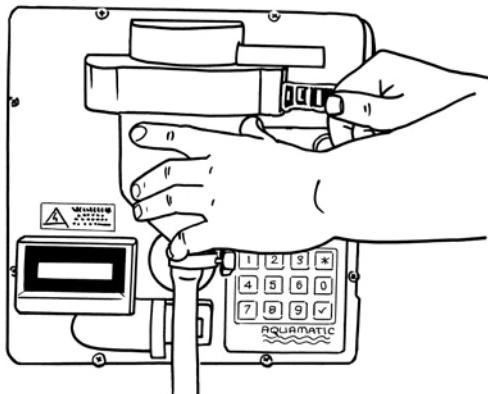
1. Remove the Intake Hose.

Figure 4.2



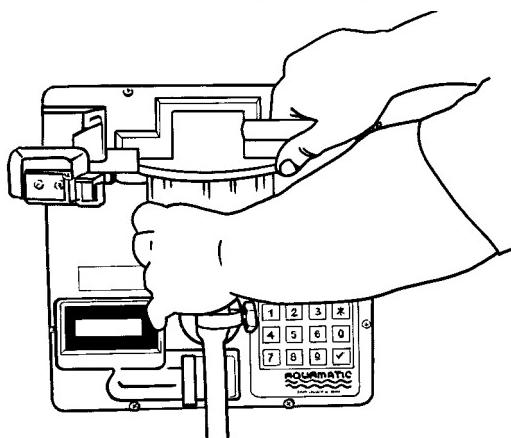
2. Release retaining clip at right side of the top clamp.
3. Hinge open the top clamp whilst gripping the chamber to ensure that it stays in place.

Figure 4.3



4. Gripping the chamber top pipe with one hand and the chamber with the other, carefully release the chamber/chamber top assembly from the top clamp.

Figure 4.4



5. Carefully remove the chamber top assembly from the chamber assembly using the top pipe as a lever.

Carry out the above procedure in reverse order to replace the Sample Chamber.

Changing the Sample Shot Volume

The Sampler is supplied set to extract a nominal 100ml sample shot volume and in the majority of applications this is adequate. Certain applications may require sample shots which are larger or smaller and this is achieved by removing the Sample Chamber and simply cutting the Volume Control Tube to the length required. The scale on the side of the Sample Chamber can be used to gauge the length of the Volume Control Tube. (A spare length of silicon rubber tube is included with the Sampler for this purpose).

Where a more precisely determined sample volume is necessary, sample shot volume can be measured using a suitable measuring cylinder. Samples are deposited into the measuring cylinder and the volume noted. The Volume Control Tube length is progressively adjusted between samples until the required sample shot volume is achieved.

Note 1: Sample shot volume repeatability is degraded at volumes in excess of 400ml.

Note 2: Sample shot volume is limited to 100ml when Sampler is used with either of the 12 bottle bottlers.

Sampling Frequency

The need to sample automatically arises because of the continuously changing flow and composition of the wastewater. It is therefore essential to take samples over the entire period that the liquid flow is being examined. The frequency of sampling during the sampling period usually relates to the volume of wastewater, which has flowed. i.e. samples are taken every X litres.

In applications where the flow is constant then it is sufficient to take samples at equal time intervals in order to acquire samples at equal flow increments.

Having established the need to take samples at equal flow increments, consideration should be given to the actual size of the increment. You should be sure that the flow increment is not so big that short-term changes in the constituents of the wastewater are ignored if they occur between samples. On the other hand sampling frequency should always be kept to a minimum to minimise wear on the Sampler.

Distributor Pipe Alignment (Detachable Bottlers)

The distributor pipe alignment is factory set and the only time it should need altering it is if you decide to change bottle carriers. Although the Bottler distributor Unit is designed to fit any of the bottle carriers, it is necessary to realign the distributor pipe when changing between 4, 12 and 24 bottle, carriers.

The 4 and 24 bottle carriers require the distributor pipe outlet to be centrally positioned over the Container to ensure the sample enters the Container correctly. The 12 bottle carriers, on the other hand, require the distributor pipe to be offset in a clockwise direction (looking down onto the Bottler) so that the sample is poured onto the sloping face of the distributor tray recess. This avoids unnecessary splashing and the danger of water flowing over the barrier between bottles.

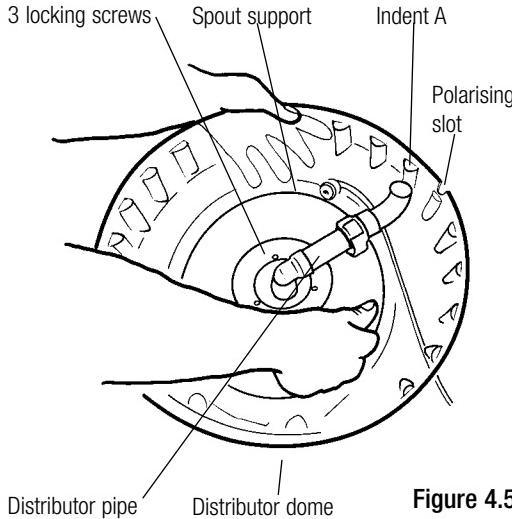


Figure 4.5

To adjust the distributor pipe alignment proceed as follows (see illustration below):

1. Ensure distributor pipe is in the “bottle 1 position” (switch power off then on to reset, if unsure).
2. Loosen the 3 locking screws.
3. Grip the distributor dome and the spout support.
4. Rotate spout support on it's friction bearing until the desired alignment is reached.
5. Tighten locking screws.
6. Carry out a wet test to ensure that the sample enters the Container correctly (readjusting if necessary).

Note:

4.9

4 Bottle Bottlers

Distributor pipe should be aligned as indicated on the distributor Unit label.

12 Bottle Bottlers

Distributor pipe should align with indent A.

24 Bottle Bottlers

Distributor pipe should align with a position centrally between indent A and the polarising slot.

Advanced operations

Having become familiar with the basic operations of the Sampler, the next thing to consider is how to program the Sampler to carry out a whole sequence of sample shots for your particular application.

Programming the Sampler

Programming should start with the screen showing either *DEFAULT DISPLAY 1*:

SAMPLER
READY

or *DEFAULT DISPLAY 2*:

SAMPLER+BOTTLER
READY

Depending on whether the Sampler is programmed to operate with a Bottler or not.

Before attempting to program the Sampler, please note the following simple rules.

1. When in the programming mode the top line of the display indicates parameters where a user choice is available and the bottom line of the display indicates the option currently selected.
2. An ***** positioned top right of the display invites you to press the “*****” button one or more times to reveal all the options available.
3. When you reach the desired option you should press the “**✓**” button to enter your choice and move on to the next parameter.
4. When the choice is a numerical one – such as date / time, then the entire bottom line of the display will flash. This is an invitation to either accept the entry as it is by pressing the “**✓**” button, or to change it by entering one digit at a time starting with the first digit on the left of the display – successive digits will flash in turn. When you have completely entered your choice the bottom line of the display will flash once more inviting you to either accept or amend the entry.
5. When the choice is a numerical one but with limited selection – such as **NUMBER OF BOTTLE LOCATIONS** the ***** will appear and the procedure is as described above.
6. 24 hour clock time settings are used throughout.

First you will be asked to **SELECT MODE** and given the option of either **SYSTEM-SETTINGS** i.e. checking / amending the samplers operating system or **PROGRAM SETTINGS** i.e. checking / amending the samplers “day-to-day” program.

When you first operate the Sampler you will need to check that the samplers operating system is in keeping with the requirements of your particular application, so choose **SYSTEM SETTINGS** and proceed to check / amend the various options available.

The majority of users will only have a very simple application – operating continuously and taking samples at regular intervals, for example. These users will soon find that they are negating most options and so ensuring the absolute simplicity of programming the Sampler. In the above example programming the Sampler would involve setting just one parameter – **INTERVAL**.

Although many Sampler applications are undoubtedly simple in the extreme there are also applications where it is invaluable to be able to exercise one or more, of the many system options available to the Aquacell user.

Having programmed **SYSTEM SETTINGS** according to your application you will find that the screen reverts to **PROGRAM SETTINGS**. Check / amend the program options (these options will be appropriate to the system you have just programmed) and the Sampler is programmed.

In future provided you do not wish to change any system settings, programming the Sampler is just a case of ticking **PROGRAM SETTINGS** and checking / amending the program options as required.

Programming Procedure

Press SET PROG button to get into programming mode. The following is a list of display readouts in bold capitals (Where there is an alternative then this is shown in []) with identification codes in *ITALIC* capitals to help you navigate your way through your particular program, together with instructions, a few words of explanation, application examples etc... Check through each as appropriate and you will have installed a program in your Sampler, which meets your exact requirements.

INDENT	DISPLAY SHOWS	ACTION / COMMENTS
<i>SETPROG</i>	SELECT MODE * PROGRAM SETTINGS [SYSTEM SETTINGS]	Select SYSTEM SETTINGS initially. In future you would select PROGRAM SETTINGS unless you wished to change the operating system of the Sampler. Now see SYS1 if SYSTEM SETTINGS selected or PROGSAM1 if PROGRAM SETTINGS selected.

System Settings - General

IDENT	DISPLAY SHOWS	ACTION / COMMENTS	
SYS1	SELECT LANGUAGE ∵ ENGLISH [OTHER LANGUAGES]	Select the language of your choice. Now see <i>SYS2</i> .	
SYS2	DATE 05-07-00	TIME 08:30	This is the date / time now. Set the date / time taking care to enter 2 digits at each stage. For example enter 05 not 5. Time should rarely (if ever) need correcting apart from the twice per year daylight saving time shift. Now see <i>SYS3</i> .
SYS3	EVENT LOG ENABLE ∵ YES [NO]	The Sampler is capable of logging every sample attempt / Bottler increment (if appropriate) / and fault occurrence (see Maintenance for details of fault registration) (Plus optional temperature logging). This can be omitted for simplicity or included if such detailed information is required. Select YES or NO . Now see <i>SYS4</i> .	
SYS4	TEMP LOG ENABLE ∵ YES [NO]	Temperature logging is not available with Aquacell S100/S300 models. Select NO . Now see <i>SYS5</i> .	
SYS5	LOW POWER MODE ∵ YES [NO]	When the Sampler is in the low power mode it “goes to sleep” after about 3 minutes with no button pushes. This means that the display switches off and the system goes into hibernation until called upon to act. To restore normal operation the user just needs to push any button. With Aquacell S100/S300 models LOW POWER MODE is probably an inconvenience with little benefit to the user. Note: LOW POWER MODE can not be used when Sampler is programmed in FLOW mode. Note: LOW POWER MODE disables the Sampler Warning Output relay. Select YES or NO . Now see <i>SYSSAM1</i> .	

Systems Settings - Sampler

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
SYSSAM1	BOTTLER FITTED * YES [NO]	Select YES when the Sampler is to be used with one of the 3 bottlers (multiple bottle formats) or NO when the Sampler is to be used with a single Container. Now see SYSSAM2.
SYSSAM2	SHOTS / SAMPLE 01	A sample is usually a single shot sample, however, there are applications where a 500ml (100ml in the case of the 12 bottle bottlers) shot of liquid at one time is insufficient for the requirements of the application. If this is the case then set number of shots as appropriate. When multiple-shot sampling is opted for then every reference to sample means XX shots. Now see SYSSAM3.
SYSSAM3.	INITIAL SAMPLE * YES [NO]	You can choose to take a sample either at the beginning of a routine or after the first time interval / flow increment. When the application is to obtain flow proportional samples then the samples should always be taken after a certain volume of water has passed the sampling point and therefore an initial sample should not be taken. Where the requirement is to take samples from a sampling point at equal time intervals commencing at a certain time then an initial sample is sometimes appropriate. Select YES or NO . Now see SYSSAM4.
SYSSAM4	SAMPLING MODE * TIME [FLOW]	Samples can either be taken at fixed time intervals or, when coupled to a suitable flowmeter, at equal flow increments (see SAMPLING FREQUENCY page 3.14). Select either TIME or FLOW . Now see SYSSAM6 If you selected TIME , OR SYSSAM5 if you selected FLOW .
SYSSAM5	FLOW SIGNAL * IMPULSE [4/20mA]	Sampler will accommodate either an impulse signal repeating at equal flow increments or a 4/20mA signal corresponding to flow rate. Select either IMPULSE or 4/20mA . Now see SYSSAM6.

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
SYSSAM6	REMOTE CONTROL * YES [NO]	The sampling routine can be inhibited / enabled by an external signal (see SYSSAM7 for details). Select YES or NO . If YES see SYSSAM7, if NO see SYSSAM9.
SYSSAM7	CONTROL MODE * SAMPLER ENABLE [PUMP/TIME TRIG]	<p>With SAMPLER ENABLE selected Sampler will remain dormant during its sample routine until the external signal appears (or, if a TRIGGER DELAY has been selected [see SYSSAM8 for details], until the external signal has been present for the period of the trigger delay).</p> <p>EXAMPLE – We only want to take samples when the pump discharging the effluent is running, during the period of the sample routine.</p> <p>With PUMP / TIME TRIG selected Sampler will take time based samples, which can be temporarily inhibited by a signal from the pump which is generating the wastewater flow. The method of operation is as follows: The Sampler will take time based samples provided the effluent pump is running. If the effluent pump is not running at the time the Sampler is due to sample then the Sampler does not take a sample. If the pump commences during the ensuing time interval then the Sampler will take a sample at the point of switch on (or, if a TRIGGER DELAY has been selected, after the pump has been running for the period of the trigger delay).</p> <p>The next sample will be taken at the end of the programmed interval (provided the pump is running). Provided the pump operates for some period during the sample interval then the Sampler will extract the number of samples expected, consistent with the programmed interval.</p> <p>Note: PUMP/TIME TRIG can not be used when Sampler is programmed in FLOW mode.</p> <p>Select SAMPLER ENABLE or PUMP / TIME TRIG. Now see SYSSAM8.</p>

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
SYSSAM8	TRIGGER DELAY 00 HOURS 00 MINs	A delay can be programmed in the samplers recognition of the external signal. This delay is typically used when a pump is providing the control signal to allow the pump to establish a representative flow. Set time. Now see SYSSAM9, (or SYSSAM11 if multiple bottle format).
SYSSAM9.	OVERFILL PROT * YES [NO]	The number of samples can be limited, when using a single composite sample Container to avoid overfilling. Select YES or NO . If YES see SYSSAM10. If NO see SYSSAM 11.
YSSAM10	MAX SAMPLES 0050	Set limit to number of samples deposited. Now see SYSSAM11.
SYSSAM11	PRE PURGE 03 SECONDS	See Setting the Purge Times page 4.5. Set time. Now see SYSSAM12.
SYSSAM12	POST PURGE 06 SECONDS	See Setting the Purge Times page 4.5. Set time. Now see SETPROG (or SYSBOT1 if Bottler is included).

This completes the programming of the samplers operating system, when programmed to operate without a Bottler.

If a Bottler is included then continue as follows:

System Settings - Bottler

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
SYSBOT1	BOTTLE LOCATIONS * 24 [other bottle location number selections]	Set according to Bottler format. Now see SYSBOT2.
SYSBOT2	RE-CYCLE * YES [NO]	Bottler can either stop on last bottle or continue on to bottle 1 and repeat its cycle continuously. Select YES or NO . Now see SYSBOT3.

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
SYSBOT3	BOTTLER MODE * SINGLE [GROUP]	In SINGLE mode each bottle is addressed individually according to the program selected. In GROUP mode a nominally identical sample is deposited into each bottle of a group simultaneously* - Perhaps a bottle for each interested party, or possibly a separate bottle for each determinant. (Necessary where preservative dosing of the sample is required for example.) Select SINGLE or GROUP . If SINGLE see SYSBOT5 . If GROUP see SYSBOT4 .
SYSBOT4	BOTTLES/GROUP * 2 [other group sizes]	Select number of bottles to be addressed simultaneously* (2, 3, 4, 6, 8, 12 or 24) This number must be less than or equal to the number of bottle locations. Now see SYSBOT5 .
SYSBOT5	INCREMENT BY * TIME [SAMPLES]	The Bottler can be programmed to move from one bottle to the next (or one group to the next if Bottler is in GROUP mode) either at regular time intervals or after a fixed number of samples. Select TIME or SAMPLES . Now see SETPROG unless TIME is selected and SAMPLING MODE is set to FLOW , then see SYSBOT6 .
SYSBOT6	MAX SAMPs / BOT 0007	Set limit to number of samples deposited in each bottle. Further samples are inhibited until Bottler advances to next bottle. Now see SETPROG .

This completes the programming of the samplers operating system when programmed to operate with a Bottler.

*Samples are actually deposited into each bottle in a group successively but the time delay between each deposition is only the sample cycle time (seconds) and hence in many cases samples can be regarded as being taken simultaneously.

Having programmed the Sampler's operating system, the next thing to do is to program the Sampler to carry out the particular duty required, so the PROGRAM SETTINGS must be determined. Now proceed as follows:

Program Settings - Sampler

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
PROGSAM 1	START ROUTINE * 06-10-00 08:15 [IMMEDIATELY]	Set a date / time for the sample routine to commence, or select IMMEDIATELY . If IMMEDIATELY is selected the sample routine will start at the time the "RUN PROG" button is pressed. Now see <i>PROGSAM2</i> .
PROGSAM2	STOP ROUTINE * 06-10-00 17:15 [NON STOP]	Set a date / time for the sample routine to stop, or select NON STOP . Now see <i>PROGSAM3</i> if time between START ROUTINE and STOP ROUTINE is less than 24 hours. If not, either see <i>PROGSAM4</i> if SAMPLING MODE, TIME selected, <i>PROGSAM5</i> if SAMPLING MODE, FLOW / IMPULSE SELECTED , or <i>PROGSAM6</i> if SAMPLING MODE, FLOW / 4-20mA selected.
PROGSAM3	REPEAT DAILY * YES [NO]	If the duration of the sampling routine is less than 24 hours it can be repeated daily if required. Select YES or NO . Now either see <i>PROGSAM4</i> if SAMPLING MODE, TIME selected, <i>PROGSAM5</i> if SAMPLING MODE, FLOW / IMPULSE selected, or <i>PROGSAM6</i> if SAMPLING MODE, FLOW / 4-20mA selected.
PROGSAM4	SAMPLE INTERVAL 01 HOURS 00 MINS	Set time. Now see <i>DEFAULT DISPLAY 1</i> if Sampler is programmed to operate without a Bottler. If Sampler is programmed to operate with a Bottler, either see <i>PROGBOT1</i> if INCREMENT BY SAMPLES is programmed, or <i>PROGBOT2</i> if INCREMENT BY TIME is programmed.
PROGSAM5	IMPs PER SAMPLE 0001	Set number of impulses. Now see <i>DEFAULT DISPLAY 1</i> - if Sampler is programmed to operate without a Bottler. If Sampler is programmed to operate with a Bottler, either see <i>PROGBOT1</i> if INCREMENT BY SAMPLES is programmed, or <i>PROGBOT2</i> if INCREMENT BY TIME is programmed.

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
PROGSAM6	INTERVAL AT F.S. 010 MINs	<p>Set interval between sample shots at full scale flow i.e. when current signal is 20mA.</p> <p>Note: Interval at half scale (12mA) would be twice that at full scale.</p> <p>Now see <i>DEFAULT DISPLAY 1</i> if Sampler is programmed to operate without a Bottler. If Sampler is programmed to operate with a Bottler, either see <i>PROGBOT1</i> if INCREMENT BY SAMPLES is programmed, or <i>PROGBOT2</i> if INCREMENT BY TIME is programmed.</p>

This completes the program installation when Sampler is programmed to operate without a Bottler.

If a Bottler is included then continue as follows:

Program Settings - Bottler

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
PROGBOT1	SAMPLES PER BOTTLE 002	Select the number of samples to be deposited into a bottle before the Bottler indexes to the next bottle (or next group if Bottler is in GROUP MODE). <i>NOW SEE DEFAULT DISPLAY 2.</i>
PROGBOT2	TIME PER BOTTLE 00 HOURS 30 MINS	Select the time samples are to be deposited into a bottle before the Bottler indexes to the next bottle (or next group if Bottler is in GROUP MODE). <i>Now see DEFAULT DISPLAY 2.</i>

This completes the program installation when Sampler is programmed to operate with a Bottler.

Special Options

An additional menu of system options is available for functions which are only required for specialised applications. This menu can only be accessed when the screen shows either *DEFAULT DISPLAY 1* or *DEFAULT DISPLAY 2*.

To enter the **SPECIAL OPTIONS** menu press and hold “**⋮**” button for at least 2 seconds then release and briefly press “**✓**” button.

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
<i>SPECOP1</i>	SPECIAL OPTIONS ⋮ YES [EXIT]	Select YES to see options available or EXIT to return to default display. Now see <i>SPECOP 2</i> if YES is selected or default display if EXIT is selected.
<i>SPECOP2</i>	AUTO RESTART ⋮ NO [YES]	The Sampler can be made to automatically restart its program after a power interruption. (This option is not available when a Bottler is connected). Select YES or NO . Now see <i>SPECOP 3</i> .
<i>SPECOP3</i>	SHOTS / BOTTLE ⋮ NO [YES]	The Sampler can be made to deposit individually designated numbers of sample shots into each bottle of a bottle array when in GROUP mode. Select YES or NO . Now see <i>SPECOP 4</i> .
<i>SPECOP4</i>	RELAY OUTPUT ⋮ SAMPLE ACQUIRED [DURING SHOT]	Sample Acquired relay output can be reprogrammed to close for the duration of the sample shot. Select SAMPLE ACQUIRED or DURING SHOT . Now see <i>SPECOP 1</i> .

Special Options Indication

Having selected one or more of the 3 available SPECIAL OPTIONS the default screen will show a 3-digit code positioned at the bottom left of the display. The digits show 0 for option not selected and 1 for option selected (choice in []), for SPECOP2, SPECOP3 and SPECOP4 respectively.

Example: Default screen shows **010** at the bottom left of the display. This means that SPECOP3 has been programmed.

SPECOP3 – Programming the number of shots for each bottle

Set up the Sampler / Bottler program as required (See Programming Procedure, page 4.11) up to SYSTEM SETTINGS – BOTTLER, SYSBOT3. Select GROUP and proceed as follows:

IDENT	DISPLAY SHOWS	ACTION / COMMENTS
SYSBOT4A	BOTTLES/GROUP * 2 [other group sizes]	Select number of bottles to be addressed simultaneously* (2,3,4,6,8,12 or 24) . This number must be a sub-multiple of or equal to the number of bottle locations. NOW SEE SYSBOT5A
SYSBOT5A	BOTTLE = 01 * SHOTS = 02	Use to select the bottle number and input a 2 digit number using the number keys to select the number of shots required to be deposited into each bottle of the bottle array. NOW SEE SETPROG

**Samples are actually deposited into each bottle in a group successively but the time delay between each deposition is only the sample cycle time (seconds) and hence in many cases samples can be regarded as being taken simultaneously.*

Viewing the Program

You are likely to want to finally assess the program you have just entered either before running it, whilst it is running or after it has completed. To do this, press “VIEW PROG” button. The display will now step through your chosen program indicating start and stop times, frequency of sampling, frequency of Bottler incrementation (if Bottler fitted) and total number of sample shots attempted / completed. Finally, if EVENT LOG ENABLE has been selected the display will show:

VIEW LOG *

Successive depressions of the “*” button will now cause the display to reveal the contents of the Sampler’s event log with a corresponding 3 digit event number and date / time against each event. The event log contains up to 150 events including the following (The list includes all possible events which the Sampler is able to recognise.):

EVENT CODE*	EVENT	DISPLAY SHORT FORM	COMMENTS
0	Sample acquired	SAMPLE OK	A sample has been successfully acquired.
1	Fault - Guard probe hit	GUARD HIT	The short guard electrode has been hit before the long electrode. (See Maintenance section for details.)
2	Fault - Low supply voltage	LOW VOLTS	Battery has become fully discharged. (See Maintenance section for details.)
3	Fault - Bottler	BOT FAULT	Electrical signals from Bottler are incorrect. (See Maintenance section for details.)
4	Fault – Intake phase time out	TIMED OUT	Sampler has failed to induce a sufficient volume of liquid into its Sample Chamber within the allotted time (68 seconds). (See Maintenance section for details.)
5	Maximum samples reached	MAX SAMPS	Triggers when overfill protection limit is reached. (Single Container programs only.)
6	Fault - Probe open circuit	OPEN CCT	One or more of the 3 stainless steel electrodes is not connecting to its contact springs at commencement of the sample cycle. (See Maintenance section for details.)

EVENT CODE*	EVENT	DISPLAY SHORT FORM	COMMENTS
7	"STOP" button pressed	STOPPED	The STOP button has been pressed during a program.
8	Fault - Probe short circuit	SHORT CCT	There is a conductive path between the common centre stainless steel electrode and either one or both the long and short stainless steel electrodes at commencement of the sample cycle. (See Maintenance section for details.)
9	Remote input on	REM I/P ON	Remote control input short circuited.
10	Remote input off	REM I/P OFF	Remote control input open circuited.
11	Increment Bottler	INC BOTTLER	Bottler has moved to its next programmed location.
12	Fault - Temperature sensor	T/SENS FLT	This event only occurs if the Sampler has been incorrectly programmed to operate with temperature logging (which is not available with Aquacell S100/S300 models).
13	Program complete	PRG COMPLET	Program has been carried out.
14	Not used		
15	Increment Bottler	INC BOTTLER	Bottler has moved to its next location after the programmed number of samples.
16	Program started	PRG STARTED	Program has been initiated by pressing the RUN PROGRAM button.

* See Optional RS232 interface, page 4.24.

Subsequently the display will revert to either the default display or, if a program is running, to the "program running - status" displays. See RUNNING THE PROGRAM, (page 4.23).

Running the Program

Press RUN PROG button. First the sampler's data logger will be wiped clean and the sample shot counter will be reset to zero. The selected PROGRAM will then be executed. The bottler (if fitted) will first move to the "Bottle 1 position" and the display will show:

**TESTING BOTTLER
PLEASE WAIT**

The display will then cycle continuously through the "program running – status" displays as follows: *DISPLAY A*, *DISPLAY B*, (*DISPLAY C* if bottler is included), *DISPLAY A*, etc...

IDENT	DISPLAY SHOWS	COMMENTS
<i>DISPLAY A</i>	PROGRAM RUNNING 01-07-00 11:24	Shows status of sampler and provides a date / time check.
<i>DISPLAY B</i>	NEXT SAMPLE DUE 00Hr 00Min 19Sec	Provides an indication of when the next sample can be expected.
<i>DISPLAY C</i>	BOTTLER INC. IN 00Hr 05Min 25Sec	Provides an indication of when the next bottle (or group of bottles when BOTTLER MODE, GROUP is selected) will be addressed.

In addition to the above status displays the sampler will also display fault messages relating to any faults which may have occurred during the program. The screen will alternate between the status displays and a fault message with each successive cycle showing successive fault messages (if there is more than 1 fault message) with each cycle. If a fault occurred more than once in a program then it will still only be shown once (Reference to the event log will be required to find out full details of fault occurrences). Fault messages are displayed every few seconds and are accompanied by a bleep sound. When the program has completed the display will show:

**PROGRAM or MAXIMUM SAMPLES
COMPLETE REACHED**

if **OVERFILL PROTECTION** has been selected and the PROGRAM has been terminated by the chosen limit having been reached) and alternate with successive faults which have occurred during the PROGRAM.

Taking Spot Samples During a Sampling Program

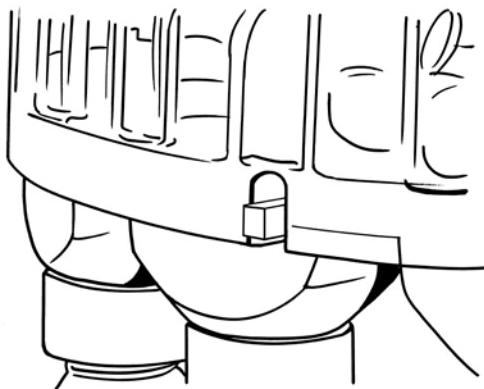
Often a spot sample is required at a particular time as witness to a particular flow event for example, and this is easy to do even when the sampler is in the middle of a SAMPLE ROUTINE. Simply check the display to ensure that a programmed sample is not about to be taken, exchange the sample collection vessel for a temporary substitute one and press the "SPOT SAMPLE" button. The sampler will discharge the spot sample into the substitute vessel and then continue its program. Even if an automatic sample happened to be called upon during this event then the sample would simply be delayed until the spot sample had been completed which should be long enough to replace the original sample collection vessel.

Bottlers

Detachable Bottlers

All Aquamatic detachable bottlers comprise a distributor unit characterised by its transparent distributor dome, a distributor pipe and a bottle carrier. It is most important when locating the distributor unit on the bottle carrier that the polarising slot in the distributor dome engages with the corresponding peg on the bottle carrier.

Figure 4.6: Locating Distributor Unit on Bottle Carrier



When using one of the two 12 bottle bottlers it should be borne in mind that there is an upper limit on sample shot volume of about 100ml. This is imposed by the rate at which the distribution tray is able to disperse the water into the bottle.

Self-Emptying Bottler

The Self-Emptying Bottler operates in a similar way to the standard bottler except that it drives at a much slower rate (time to complete the full 360 degrees is about 75 seconds). As the distributor pipe moves round it causes the two 4.5 litre containers to tip out their contents in turn. The tipped samples are fed down a gravity drain to waste.

A typical requirement for the Self-Emptying Bottler is to collect 24-hour composite samples in each container in turn, disposing of the next container's contents immediately before commencing the next composite sample. In this way "yesterday's sample" is always available. The following abbreviated example program should achieve this requirement:

SAMPLING MODE TIME
BOTTLE LOCATIONS 2
RECYCLE YES
BOTTLER MODE SINGLE
INCREMENT BY TIME
SAMPLE INTERVAL 01HOURS 00MINS
TIME PER BOTTLE 24HOURS 00MINS

Leaving the Sampler to Operate Automatically

- Ensure that the sample container(s) is (are) clean and dry.
- Locate the sample collection vessel taking care to ensure that the samplers Pinch Valve Tube (the sample discharge point) is properly located in the collection vessel point of entry.
- Switch on power.
- Program the sampler as required.
- Take a few spot samples to verify operation (you may wish to use a substitute sample container to collect these samples in order not to contaminate the sample collection vessel to be used for the sample program).

- Press “RUN PROG” button.
- Close and secure front cover / door as appropriate.
- Leave sampler to extract its programmed samples.
- NB You may find the Test Mode (see page 5.7) useful when setting up the sampler).

Returning to Collect Samples

- Open front cover / door.
- Press “VIEW PROGRAM” button to check the sampler’s movements.
- Press “STOP” button.
- Remove sample collection vessel(s).
- Either decant the samples into separate containers or retrieve the charged sample collection vessel(s) intact as required. NOTE Provision should be made to maintain sample at a nominal 4°C during transportation back to the laboratory.

A Few DO'S and DON'TS

Do's

1. Do ensure that the plastic surface inside the chamber top, particularly between the electrodes, is kept clean and free from wastewater contamination.
2. Do ensure intake filter is correctly suspended in the water.
3. Do ensure that there are no leaks in Intake Hose joints. Leaks will cause air bubbles to be entrained in the water being drawn up the Intake Hose and, in turn, the samplers lift velocity will be degraded.
4. Do ensure there are no sags in the Intake Hose. - These retain water from previous samples and cause cross contamination of samples.
5. Do check humidity indicator regularly. It is vital that all the electrical parts are kept dry. Always change the Desiccant Bag when 40% circle on indicator turns pink.
6. Do take great care to ensure that sample frequency and size are optimised to provide a true representation of the wastewater flow. Companies can often obtain advice from their local water company particularly where samples are being taken in connection with charge assessment / consent limits.
7. Do disconnect battery (if fitted), if Sampler is not used for prolonged periods, as failure to do so can cause damage to the battery.
8. Do keep the sample volume small where a wastewater has the potential to create foam. This has the effect of minimising the time that wastewater is dropping out of the Volume Control Tube and hitting the surface of the wastewater accumulating in the Sample Chamber, (so creating foam), before the Volume Control Tube becomes immersed.

Don'ts

1. Don't leave samples for longer than necessary before analysing. When the samples are biologically active, the degradation can be minimised by storing them in a refrigerator set to about 4°C.
2. Don't allow Sampler to cycle more frequently than necessary, particularly at high lifts and / or at high ambient temperature, and don't set unnecessarily long purge times as this will impose unnecessary wear on the pump.
3. Don't allow wastewater to splash the inside of the Sample Chamber top as this will cause the inside of the Chamber Top to build up a layer of wastewater residues. This in turn can lead to PROBE SHORT CCT / GUARD PROBE HIT faults (see page 5.1 Maintenance). When water enters the chamber erratically it is likely that the intake is not fully immersed. Check and correct if necessary.

5

MAINTENANCE

General

The only routine user maintenance required by the Aquacell S100/S300 Samplers is to keep the sample tract clean and to ensure that electronic / electrical hardware inside the sealed Sampler Module remains dry.

Occasionally it may be necessary to lubricate the pinch valve using Pinch Valve grease Part No. CL-6140*. A small deposit of grease is applied to the piston shaft and spread over the working surfaces by manually moving the piston in and out.

It is also a good policy to maintain the Sampler and its accessories in a generally clean condition bearing in mind the potential infection hazards associated with wastewater.

* Caution - use only the recommended grease.

Cleaning The Sample Tract

The method adopted to clean the sample tract will depend on how sensitive the application is to cross contamination.

Most parts of the sample tract are easily accessible and can be cleaned with a detergent and / or a cream cleaner such as "CIF" using a suitable brush.

Inaccessible parts of the sample tract are usually flushed out with clean water. Where the Sampler has to be completely free from the contamination of previous sampling operations then replacement of inaccessible parts is the only option.

The frequency of cleaning will depend very much on the application. Initial operating experience with the Aquacell S100/S300 Samplers will enable you to decide how frequently the sample tract needs to be cleaned in order to ensure that reliable and representative samples are always available.

The parts of the sample tract which need to be kept clean are as follows:

Intake Hose Assembly

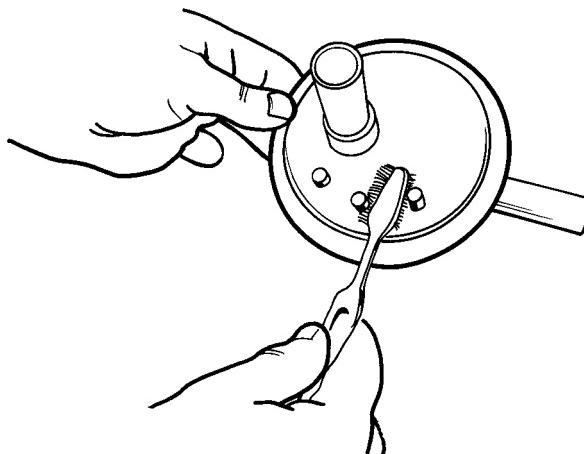
Loosen the hose clamp to remove. Either flush out with clean water or replace.

Sample Chamber / Chamber Top

Remove the Sample Chamber assembly. (See Removing / Refitting the Sample Chamber, Page 4.6.)

Clean the Sample Chamber with a cleaning sponge using a detergent solution followed by a clean water rinse. Stubborn deposits may require a more aggressive cleaner.

Figure 5.1



Clean the Sample Chamber top in a similar manner but using brushes instead of a sponge. A small diameter bottle brush or similar can be used to clean the inside of the horizontal top pipe, and the vertical Volume Control Tube.

A small toothbrush (or similar) can be used to reach the base of the 3 electrodes and the inside surface of the chamber top between the electrodes. Clean the 3 electrodes both above and below the chamber top.

It is important when cleaning the Sample Chamber top to ensure that the inside surface, particularly between the electrode pins is kept free of wastewater contamination. Wastewater deposits can, when combined with condensation, (which often forms on the inside of the chamber top) form a conductive layer between the electrode pins which may lead to the occurrence of **PROBE SHORT CCT** and **GUARD PROBE HIT** faults.

Sample Collection Vessel

The method used to clean the Sample Collection Vessel will vary depending on which format is purchased.

10 Litre Polypropylene Container Format:

Remove lid by flipping up the peripheral lip. Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

25 Litre Polyethylene Container Format:

Remove the central access disc for cleaning. Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

2 x 4.5 Litre Self-Emptying Polypropylene Bottler Format:

Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

4 x 4.5 Litre Glass Bottler Format:

Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

4 x 5 Litre Polyethylene Bottler Format:

Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

4 x 12 Litre Polyethylene Bottler Format:

Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

12 x 0.7 Litre Glass Bottler Format:

Either clean in a bottle washer or replace.

12 x 1 Litre P.E.T. Bottler Format:

Either flush with clean water or replace.

24 x 1 Litre HDPE Bottler Format:

Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

Bottler Distributor Pipe

The Distributor Pipe is flipped out of its retaining clip for cleaning. Cleaning with a brush using detergent solution, followed by a clean water rinse is usually sufficient.

Keeping the Inside of the Sampler Module Dry

See Page 5.5 Figure 5.2 Humidity Indicator / Desiccant Bag Location access plug.

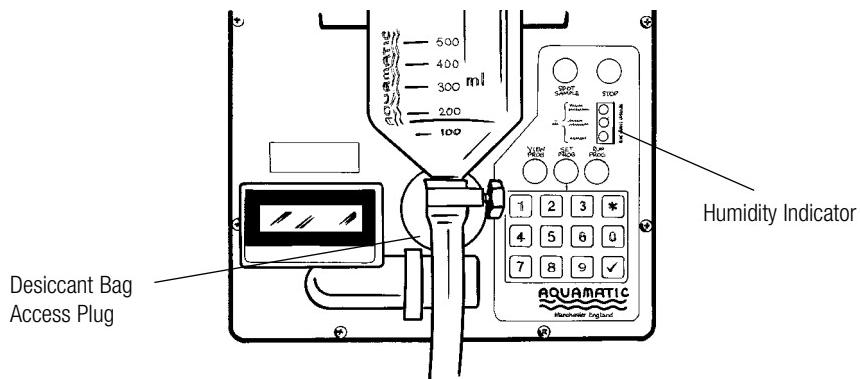
During normal operation the Sampler Module will gradually admit moisture (despite it being a nominally sealed enclosure).

The humidity level within the Sampler Module is indicated by the 3 Stage Humidity Indicator on the Keypad. All the circles on this indicator should show BLUE initially. As the humidity level in the Sampler Module gradually rises over time, the bottom (30% relative humidity), middle (40% relative humidity) and ultimately the top circle (50% relative humidity) change colour from BLUE to PINK.

It is recommended that as soon as the middle circle starts to change colour, the Desiccant Bag be changed. The interval between Desiccant Bag changes is generally several months dependent on the ambient conditions, to which the Sampler is exposed.

To change the Desiccant Bag remove the Sample Chamber assembly. Remove the Desiccant Bag access plug at the rear of the Sample Chamber (push the plug into its recess to facilitate withdrawal). Withdraw the Desiccant Bag and discard. The new Desiccant Bag should now be removed from its sealed polythene storage bag and placed in the cavity in the front panel. The Desiccant Bag access plug can now be replaced.

Figure 5.2: Humidity Indicator/Desiccant Bag Location



Trouble Shooting

If your Sampler is not operating correctly check the fault symptoms against the following list. If you are unable to remedy the problem then refer to Aquamatic Ltd or your local dealer. See Breakdown Service below.

FAULT SYMPTOM	FAULT	ACTION
1.No Display.	Power off. Electronic fault.	Connect power. Return for service.
2.Reduced sample lift capability / transport velocity	Partially blocked sample tract. Leaking top clamp pneumatic connector. Leaking chamber top Seal. Leaking pinch valve (bubbles rising through pinch valve seal). E.Leaking Intake Hose, or intake filter connection (excessive bubbles entrained in water entering Sample Chamber). F. Pump inefficiency. G. Internal pneumatic fault.	Clean sample tract. Replace 'O' ring, stub pipe. Replace 'O' ring, chamber top. Change pinch valve tube N.B. Often a new pinch valve tube will need to undergo several sample cycles before it seals properly. Check connections and seal. Return for service. Return for service.
3. Sample shot sequence in error.	Purge times are incorrectly set. Internal pneumatic / electronic fault.	Check purge times and reset, if necessary. Return for service.
4. Display shows: FAULT PROBE OPEN CCT and sample shot cycle aborts. (This message will only appear briefly if a program is not in progress when the fault occurs). N.B. This fault will not cause the program to abort. It will, however, prevent a program being initiated.	Chamber not fitted. One, or more contact springs in front panel Sample Chamber assembly recess not connecting to its respective electrode. Electronic fault.	Fit chamber. Clean tops of electrodes where contact is made with contact springs. See Cleaning Sample Tract / Stainless Steel Electrodes (page 5.2). N.B. Contacts springs should project about 6mm from their location holes. Return for service.

FAULT SYMPTOM	FAULT	ACTION
<p>5. Display shows:</p> <p style="text-align: center;">FAULT</p> <p style="text-align: center;">PROBE SHORT CCT</p> <p>and sample shot cycle aborts. (This message will only appear briefly if a program is not in progress when the fault occurs).</p> <p>N.B. This fault will not cause the program to abort. It will, however, prevent a program being initiated.</p>	<p>Conduction path exists between electrodes at start of sample cycle, possibly due to contamination caused by splashing.</p> <p>Electronic fault.</p>	<p>Clean chamber top. See Cleaning Sample Tract / Stainless Steel Electrodes (page 5.2). Modify installation to avoid splashing. See Installing the Intake Hose (page 3.5). Return for service.</p>
<p>6. Display shows:</p> <p style="text-align: center;">FAULT</p> <p style="text-align: center;">GUARD PROBE HIT</p> <p>but sample shot cycle continues normally. (This message will only appear briefly if a program is not in progress when the fault occurs).</p> <p>N.B. This fault will not cause the program to abort. It will, however, prevent a program being initiated.</p>	<p>Sample induction phase is terminated by short guard probe because long probes have become insulating due to contamination build-up.</p> <p>Sample induction phase is terminated by short guard probe because water is entering the Sample Chamber in a turbulent manner causing random triggering due to splashing.</p>	<p>Clean electrodes.</p> <p>Clean chamber top. See Cleaning Sample Tract / Stainless Steel Electrodes (page 5.2). Modify installation to avoid splashing. See Installing the Intake Hose (page 3.5).</p>
<p>7. Display shows:</p> <p style="text-align: center;">FAULT</p> <p style="text-align: center;">LOW VOLTAGE</p> <p>and Sampler locks out</p>	<p>Supply voltage below minimum threshold.</p>	<p>Restore supply voltage to correct level (by charging the battery, for example).</p>
<p>8. Display shows:</p> <p style="text-align: center;">FAULT</p> <p style="text-align: center;">TIMED OUT</p> <p>(This message will only appear briefly if a program is not in progress when the fault occurs) and the Sampler does not acquire a sample.</p> <p>N.B. This fault will not cause the program to abort.</p>	<p>Intake filter is out of the water.</p> <p>Channel is dry.</p> <p>Blocked sample tract.</p> <p>See fault symptom 2.</p>	<p>Ensure intake filter is fully immersed. See Installing the Intake Hose (page 3.5).</p> <p>Clean sample tract. See Cleaning Sample Tract / Stainless Steel Electrodes (page 5.2).</p>

FAULT SYMPTOM	FAULT	ACTION
9. Display shows: FAULT BOTTLER FITTED when “RUN PROGRAM” button is pressed and Sampler locks out.	Bottler is fitted when the Sampler is programmed not to have a Bottler.	Either reprogram or remove Bottler.
10. Display shows: FAULT BOTTLER MISSING when “RUN PROGRAM button” is pressed and Sampler locks out.	Bottler is not fitted when the Sampler is programmed to have a Bottler.	Either reprogram or fit Bottler.
11. Display shows: FAULT BOTTLER FAILED and Sampler locks out.	Electrical signals from the Bottler are incorrect.	Ensure that the Bottler connector is fully engaged, and restart the program. If this does not resolve the problem then return Bottler distributor Unit for service.
12. Display shows default display and Sampler re-boots when a sample is attempted.	Battery is completely flat.	Charge battery.

Note: Each fault symptom where the display shows **FAULT** on the top line in the above table (with the exception of fault symptoms 9 and 10) will be registered in the Sampler's event logger - provided that the logger is enabled (see Programming the Sampler page 4.10), and that a program is running at the time the fault occurred. The exact time of fault occurrence can therefore be determined.

Test Mode

The Sampler has a test mode which is very useful in helping to diagnose fault conditions both within the Sampler and in its peripheral equipment. The test mode can also be useful during commissioning the Sampler. When in the test mode, the Sampler has the following facilities:

1. Provides a check on the total number of sample shots taken by the Sampler since manufacture.
2. Self checks the major operating components of the Sampler.
3. Verifies the validity of the signals from ancillary equipment fed to the Sampler's inputs.
4. Verifies the responses of ancillary equipment to signals fed from the Sampler's outputs.
5. Carries out calibration of the Sampler's temperature probe (provided that a comparative standard is available).

To enter the test mode, press and hold "STOP" button for about 7 seconds.

To return to the normal operating mode press "SET PROG" button.

The test routine is shown in the table below. After the initial display, use " " button to step from one test to the next one.

Apart from test Bottler and test run only the bottom line of the display changes during test.

DISPLAY SHOWS	COMMENTS
total shots 0000000001	Records total number of sample shots taken by the Sampler since its date of manufacture. This display only shows briefly.
test pump * driving pump [test finished]	Press ✓ button to exercise pump. Listen to pump and check for any spurious noises.
test level det * 0514 [test finished]	Press ✓ button to check main level probe. Reading should be in the range 0500 to 0520 A reading below this range suggests that a conductive path exists between the 2 long electrodes. This probably means that the inside of the Sample Chamber top needs cleaning. A reading above this range suggests a bad contact between one or more of the spring contacts and its corresponding electrode.

DISPLAY SHOWS	COMMENTS
test guard elec * 0515 [test finished]	Press ✓ button to check guard level probe. Reading should be in the range 0500 to 0520 . A reading below this range suggests that a conductive path exists between the centre electrode and the short electrode. This probably means that the inside of the Sample Chamber top needs cleaning. A reading above this range suggests a bad contact between one or more of the spring contacts and its corresponding electrode.
test supply * 12.18 [test finished]	Press ✓ button to check power supply under load. Reading should be in the range 11.00 to 12.25 .
test valves * driving valve 1 [driving valve 2] [driving valve 3] [test finished]	Press ✓ button to check valves 1 to 3 in turn. Listen for 3 clicks as valves energise.
test acquired op * driving output [test finished]	Press ✓ button to generate Sample Acquired output. Verify that peripheral equipment responds appropriately.
test malfunc op * driving output [test finished]	Press ✓ button to generate Sampler Malfunction output. Verify that peripheral equipment responds appropriately.
test bottler * 	Press ✓ button to drive Bottler around to “Bottle 1 position”. In this test the display shows: TESTING BOTTLER PLEASE WAIT during the test and the Bottler (if connected) should start incrementing. When the Bottler reaches the “Bottle 1 position” the display will show: Bottler homed * test finished if the Bottler is operating correctly. If the Bottler is not operating correctly (or is not connected) the display will show: BOTTLER FAILED * test finished after about 60 seconds.

DISPLAY SHOWS	COMMENTS
test run * 00001 [test finished]	Press ✓ button to trigger SAMPLE CYCLE. Sampler should carry out its programmed SAMPLE CYCLE. In this test the display shows readouts appropriate to the SAMPLE CYCLE (see page 3.11) during the test. At the end of the test the display shows: SAMPLING NOW * test finished
test impulse * 00001 [test finished]	Feeding contact closures between red and black cores on ancillary signal cable should increment counter.
test 4-20 loop * 0001 [test finished]	Feed current signal into Sampler via blue core (positive) and red core (negative) on ancillary signal cable. The following current signals should produce display readings within the following ranges: 4mA (no flow) 0809-0829 12mA (half scale flow) 0385-0405 20mA (full scale flow) 0000-0000
test remote In * input open [input closed] [test finished]	Feeding contact closure between green and black cores on ancillary signal cable should make display go from open to closed .
temp correction * 24.0°C [test finished]	With temperature probe immersed in a liquid, the temperature of which is monitored by a calibrated thermometer, adjust the reading to agree with that indicated by the calibrated thermometer. Either press button 1 to increment reading by 0.1°C or press button 2 to decrement reading by 0.1°C. If the probe is faulty or not connected the display will show ??. ?°C. Not applicable to Aquacell S100/S300 Samplers.

Breakdown Service

There are no user serviceable parts on the Aquacell Sampler apart from those mentioned in this section of the User Guide. In the event of failure of a Sampler, the following procedure should be carried out:

1. Report the failure to Aquamatic, or it's approved Distributor. Often a telephone call is enough to resolve a perceived problem.

When a problem cannot be resolved over the telephone then there are two possible alternatives:

On-Site Service

Arrange for an engineer to come to site and carry out repairs – This is often the only practical option in the case of S300 Series Samplers, particularly when the fault lies somewhere other than within the removable Sampler Module.

Back to Base Service

Return the faulty item to Aquamatic, or it's approved Distributor, for repairs to be carried out in the workshop.

Proceed as follows:

Sampler Module

- Remove Sampler Module from its location and remove the battery (if fitted).
- Do not return the battery with the Sampler unless requested.
- Do not remove the Sample Chamber assembly from the Sampler.
- Pack Sampler Module (and battery [separately] if requested) in TRANSIT PACK. If you require a TRANSIT PACK please contact your supplier who will arrange for one to be forwarded to you.
- Return to Aquamatic Ltd. or it's approved distributor, for repair.

Detachable Bottler

- Pack Bottler in original TRANSIT PACK if possible. If original packaging materials have been discarded please contact your supplier who will arrange for a new TRANSIT PACK to be forwarded to you.
- Return to Aquamatic Ltd or it's approved distributor, for repair.

Other faulty hardware which is readily detachable

- Either pack in original packaging if available, or use suitable alternative packaging materials.
- Return to Aquamatic Ltd or its approved distributor for repair.

It is most important to pack items securely such that movement of the items within the pack is prevented.

NOTE Repair of transit damage is chargeable.

6

TECHNICAL SPECIFICATIONS

Performance

Environmental suitability	Not suitable for use in classified hazardous areas (see Data Table, Page 6.6, for more details)
Media/Source suitability	Wastewater from a non-pressurised sampling point
Sample extraction method	Air pump vacuum system
Sampling method	Time – Sampling frequency from 1 min to 99 hrs 59 mins Flow – 4-20mA or pulsed volt free contact closure Event – Controlled by external equipment (such as a pump or pH Meter etc..) providing volt free on / off contact
Maximum lift height	> 7 metres
Transport velocity	0.5 metres / sec (average) with 7 metre lift
Sample shot volume range	Single shot 20 - 500 ml (larger total sample volume can be achieved through programmable multiple shots / sample). 100ml maximum shot size for Samplers used with 12 bottle Bottlers
Sample shot cycle time	30 seconds (approximately) with 4 metres lift
Maximum sample media temperature	60°C
Ambient operating temperature	See Data Table, Page 6.6, for details

Materials of construction

Sampler module	Sealed Polyurethane mouldings / Stainless Steel components
S300 Cabinet	Cabinet Base: Stainless Steel 304 Cabinet Body options: Standard – Galvanised Steel, pre-treated and finished with architectural grade white polyester powder coating Optional – Stainless Steel 304 Optional – Stainless Steel 304, finished with architectural grade white polyester powder coating
Sample Chamber	Lower Compartment insulation: Expanded Polyurethane Pentane blown foam
Sample Chamber Top	Acrylic or Glass (optional) Standard - Polypropylene / Stainless Steel / Silicone Rubber Optional – PTFE / Stainless Steel / Silicone Rubber
Intake Hose with Filter	Standard - Braided PVC / Stainless Steel Optional - Braided PTFE / Stainless Steel
Sample Collection Vessels	See Data Table, Page 6.4, for details

Mechanical

User interface	17 button Control Panel incorporating tactile keys LCD 16 x 2 alpha numeric backlit (optional)
Intake Hose	10 metre long with Stainless Steel Intake Filter (cut to length to suit application)
Sample tract diameter	12mm increasing to 16mm (22mm when Bottler is in use) between Intake Filter and sample discharge
Sample Collection Vessels	See Data Table for details
Environmental protection	Electrical / electronic components housed in humidity controlled enclosures (see Data Table for more details)
Humidity control	Replaceable Desiccant Bag with 3 stage Humidity Indicator visible through Control Panel

Security	Various locking points. When secured with optional locking mechanisms the Sampler is rendered tamper proof
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Optional Connections

Ancillary signal connection (S100 - 1.5m cable, S300 Series - Optional Connections Terminal Block)

<i>Instantaneous flow input</i>	Accepts 4-20 mA into 255 ohm
<i>Pulsed flow input</i>	Accepts normally open volt free contact closure
<i>Remote control input</i>	Accepts normally open volt free contact closure - Event controlled by signal from an external device such as a pump or pH Meter etc...
<i>Sample acquired output</i>	Provides a contact closure each time a sample enters the Sampler Chamber. 1 normally open volt free 50VDC 1A rated contact pair will close for 2 seconds when the sample induction phase is terminated by wastewater bridging the 2 longer electrodes in the Sample Chamber
<i>Sampler warning output</i>	Provides a contact closure when one or more warning conditions occur. 1 normally closed volt free 50VDC 1A contact pair will open for 2 seconds (or longer in the case of power outage) when one or more warning conditions occur

RS232 interface

Event and temperature log (if specified) can be downloaded to your PC or suitable hand held computer via RS232 serial connection. 16 events relating to the Samplers operation are logged including: Program Start / Stop times, Sample acquired times, Bottler increment times, Warning conditions (11 possible)

Standards Compliance

- MCERTs – Continuous Water Monitoring Equipment Certification (see Data Table for details of model coverage)
- Water quality - Sampling - Part 10: Guidance on sampling of wastewaters ISO 5667 – 10
- CE Marked and complies with the following EC Directives:
 - EMC 2004/108/EC
 - Low Voltage Directive 2006/95/EC

Data Table

	Model				
	S100	S310	S310H	S320	S320H
General	MCERTs certified				
	Cabinet enclosure	•	•	•	•
	Sample Frost Protection		•	•	•
	Sample temperature control			•	•
Environmental	IP rating	65	54*	54*	54*
	Minimum ambient temp. (°C)	-10	5	-10	10
	Maximum ambient temp. (°C)	50	50	30	50
		•			
Power options	Integral battery 12V DC 7Ah	•			
	110/220/230V AC 50Hz	•	•	•	•
	Float charged backup battery 12V DC 7Ah	•	•	•	•
	Separate 12V DC	•			
Sample Collection Vessel compatibility	10 litre Polypropylene Container	•	•	•	•
	25 litre Polyethylene Container	•	•	•	•
	2 x 4.5 litre Self-Emptying Polypropylene Bottler	•			
	2 x 4.5 litre Self-Emptying Polypropylene Integral Bottler		•	•	•
	4 x 4.5 litre Glass Bottler	•	•	•	•
	4 x 4.5 litre Glass Integral Bottler		•	•	•
	4 x 5 litre HDPE Bottler	•	•	•	•
	4 x 5 litre HDPE Integral Bottler		•	•	•
	4 x 12 litre Polyethylene Integral Bottler		•	•	•
	12 x 0.75 litre Glass Bottler	•	•	•	•
	12 x 1 litre PET Bottler	•	•	•	•
	24 x 1 litre HDPE Bottler	•	•	•	•

* Incorporates Aquacell Sampler Module rated at IP 65

Data Table (continued)

		Model				
		S100	S310	S310H	S320	S320H
Size and Weight	Height (mm)	330	1450	1450	1450	1450
	Width (mm)	490	800	800	800	800
	Depth (mm)	300	900	900	900	900
	Weight (Kg) (excluding Sample Collection Vessel)	7.5	101	103	118	120
Electrical	Power (VA) @110V AC	60	98	598	433	598
	Surge current (A) @110V AC	-	-	-	9.5	9.5
	Power (VA) @220V AC	60	94	549	398	549
	Surge current (A) @220V AC	-	-	-	6.8	6.8
	Power (VA) @230V AC	60	98	598	433	598
	Surge current (A) @230V AC	-	-	-	7.5	7.5
Optional Connections	Ancillary Signal	•	•	•	•	•
	Bottler	•	•	•	•	•
	RS232	•	•	•	•	•



Established in 1991, Aquamatic Limited is a leading manufacturer of automatic Wastewater Sampling Equipment, based in Manchester, United Kingdom. The company and its product range benefit from over 50 years experience in the wastewater sampling industry.

From the outset the Aquamatic philosophy has been to focus strictly on the design and manufacture of uncomplicated, robust and reliable wastewater sampling equipment. By remaining committed to this goal, Aquamatic now offer a true leading edge range of products suitable for the worldwide market.

Available both direct from Aquamatic in England and around the world via a network of local distributors, Aquamatic equipment is accessible globally to any company with a requirement for high quality, dependable wastewater sampling equipment.

Aquamatic wastewater sampling equipment is used by a wide range of International companies and Organisations, including many well known names such as ABB, BNFL, Cadburys Schweppes, Heinz, Rolls Royce and Veolia. Additionally Aquamatic Wastewater Samplers are currently being used at many of the major Water Companies, both UK and Worldwide.



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